

INSTRUCTOR'S EDITION

WILLIAM BOYES



MICHAEL MELVIN



# microeconomics

NINTH EDITION

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## Selected International Examples

Below, preview just a few of the many global examples found in the ninth edition of this text.



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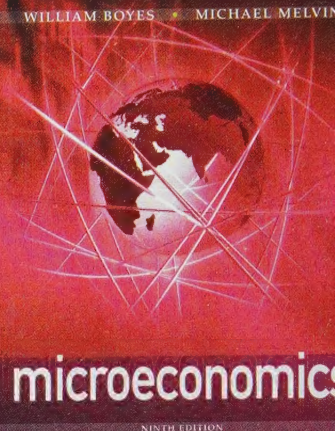




WILLIAM BOYES • MICHAEL MELVIN

# Economic understanding in a Global Context... no borders, no boundaries!

Boyes and Melvin's *Microeconomics, 9e* introduces students to the latest thinking of today's economists on important economic phenomena while equipping them with a solid global understanding of economic principles. With this edition's reader-friendly approach, carefully integrated learning features, memorable examples, and unique global emphasis, you can clearly illustrate the connections between key economic principles and today's actual business practices.



## ECONOMIC INSIGHT

### Comparative Advantage

(Salute Science for This One: Women Are Better at Ironing)

"According to a new study, women proved themselves innate domestic goddesses in a series of household tasks—threading a needle, making a bed, and ironing—beating their male counterparts in three-minute trials for each activity. But men, ever-handy specimens they are, fared better at reading maps, changing a tire, and putting a tent. The study was carried out by research analysts Mindtab International and featured more than 1,200 adults. It found clear divisions in what men and women could complete in just three minutes from a selection of various tasks. Women could iron two shirts far more adeptly in the time limit. Overall they excelled in those jobs which needed speedy hand-to-eye coordination and verbal reasoning, such as threading a needle or winning an argument with logic. Men, in contrast, did better at those jobs which needed what researchers call spatial awareness, such as map reading, understanding self-assembly instructions, and putting up a tent."

Many readers of the blog were upset at this which seemed to demean women, that they are destined to stay home

and do home chores—remain barefoot and According to the study, women have an absolute advantage in ironing, but it does not mean that they have a comparative advantage. Men can change tires faster than women, and women can iron better than men. They have both an absolute and a comparative advantage in ironing, and men have both an absolute and a comparative advantage at changing tires. But suppose women can iron 10 shirts in the same time they can change 2 men can iron 10 shirts in the same time they can change 1 tire. In this case the opportunity cost of ironing is 1/5 for women and .01 for men. Men have a comparative advantage in ironing. So it is comparative advantage determines specialization, not absolute advantage.

Source: Lauren Buss, State.com XX Factor, Tuesday, March 12

**Updated Economic Insight boxes emphasize the relevance of concepts to current events.** These new features highlight some of today's most current events to focus on the relevance and real-world applications of the concepts in the chapter.

**New and updated Economically Speaking and Commentary features highlight the economic impact of today's most important events.** Recent newspaper and magazine articles in this edition's updated and new Economically Speaking and Commentary features present economic causes and consequences of important world events.

## Economically Speaking

### WOMEN STILL LAG BEHIND MEN IN PAY

Northeast University Daily Journal (Chapel) May 15, 2011

I usually don't get tired up when it comes to pay-related feminist causes. But when it comes to what pay for men and women, I do.

The country celebrated "Equal Pay Day" on April 12. The day symbolizes how far into 2011 women had to work to earn what men had earned in 2010. That's nearly 3 and a half additional months.

In Mississippi, on average, a woman working full time is paid \$26,000 per year, while a man working full time is paid \$37,200 annually, according to research from the National Partnership for Women & Families. That's a gap of \$11,200. Nationally, full-time working women are paid \$14,822 less than men.

If the wage gap were eliminated, Mississippi's working women would have enough money for any of the following:

- 79 more weeks of food.
- Nine more months of mortgage and utilities payments.
- 14 more months of rent.
- Two more years of family health insurance premiums.
- More than 2,000 gallons of gas.

Because of the gender gap, women need to work more than 11 extra years to earn as much as men before retirement, according to The Washington Post.

Today, women are paid about 77 cents for every \$1 a man earns. The pay divides for blacks, women to 68 cents and Latinos to 52 cents. On top of that, women with children are paid 1.3 percent less than women without children. Yet, men with children get paid 2.1 percent more than men without children, according to a Government Accountability Office study. Unless things change, women won't come close to being paid the same amount as men until 2056—when today's high school seniors are preparing for retirement.

People argue that men get paid more because they enter into higher-paying jobs. The facts don't support that point of view. The National Association of Colleges and Employers last week released data showing that female graduates from the Class of 2010 are making 17 percent less than their male counterparts. Even when salary is adjusted for major, men

come out ahead in most college-graduate occupations with one exception: nursing, where women made more because they are men and a premium.

But NACE said being a man isn't a guarantee of a higher wage. Women earning degrees in paper sciences are also at a disadvantage—just averaged \$52,340 starting salary, while men averaged \$56,327. And in education—that is, dominated by women—NACE data also showed that female grads are getting the lowest percent of education grads but their starting salary was \$29,062. The men? \$30,640.

So, employers, are you ready to hire a new crop of college graduates, do your best to help close the gender gap? Women with our tale of it deserves to get paid the amount as the men do.

Source: Carol Kufus, Northeast University, Chapel Hill, N.C. 15, 2011

The largest source of government revenue is the individual income tax. Taxes can be progressive, proportional, or regressive. Progression means the higher the income, the higher is the tax rate; proportional is when the same tax rate applies to all income levels; regressive is when the higher the income, the lower is the tax rate. The income tax is a progressive tax, meaning that the higher the income, the higher is the tax rate.

The next largest tax is the Social Security tax, formally known as the Federal Insurance and Contributions Act (FICA). This tax is a 6.2% of an employee's income paid by the employer, and 6.2% paid by the employee (12.4% total, employee's share reduced to 4% in 2011). Self-employed workers must pay both halves of the Social Security tax because they are their own employers. The Social Security tax is a proportional tax up to the income level at which the tax is no longer levied. Currently, the tax is levied on incomes below \$106,800. Income above \$106,800 is not taxed. Thus considering all income levels, the FICA tax is a regressive tax. A proportional tax maintains a constant tax rate in income rises. A regressive tax means that the higher is your income, the lower is the tax rate. Together, Social Security and Medicare taxes compose the payroll tax.

The government's revenues have mostly increased over the years. There are a few years where revenues declined, mostly years of recession.

## progressive tax

A tax where the rate rises as the base increases, for example, the tax rate rises as income rises.

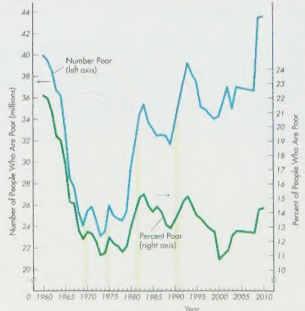
## proportional tax

A tax where the tax rate is the same regardless of the base (income). For example, the tax rate is 20% no matter what the level of income.

## regressive tax

A tax where the rate declines as the base increases.

FIGURE 4 The Trends of Poverty Incidence



The number of people classified as living in poverty is measured on the left vertical axis. The percentage of the population living in poverty is measured on the right vertical axis.

Source: www.census.gov/hhes/www/poverty.html, <http://page.ksia.gov/POVERTY/09poverty.shtml>

**Updated content keeps the course as current as possible.**

Updated examples throughout the text, extensive revisions to the chapter on elasticity, further development of the debate on government economic intervention, and a new discussion of the Economic Freedom Index keep this course up-to-date with current developments. You'll also find additional material on game theory, updated information on health care costs, and a detailed examination of income distribution.



# Economic understanding in a Global Context

DIGITAL  
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Effective, leading teaching and learning technology and a full range of supplements, including the best-selling Aplia™ homework system and CourseMate online tools, help complete your economics coverage that clarifies and emphasizes the importance of concepts for career and business success.



Created by economist Paul Romer for his classroom, Aplia is the best selling online economics product. In fact, Aplia is the most successful and widely-used homework solution in the Economics market. Aplia provides automatically graded assignments that were written to make the most of the web medium and contain detailed, immediate explanations of every question.



Chapter Assignment

Aplia's chapter-specific problem sets ensure that students are learning course concepts and practicing their application on a regular basis.

Try the sample interactive problem below.

Consider the table below showing hypothetical balance-of-payments data for the United States. Choose the correct value for each of the boxes.

| Account                 | Net Balance          |
|-------------------------|----------------------|
| Merchandise             | <input type="text"/> |
| Services                | +5                   |
| Income                  | -2                   |
| Unilateral transfers    | -8                   |
| Current account         | -30                  |
| Financial account       | <input type="text"/> |
| Statistical discrepancy | -5                   |
| Trade balance           | 0                    |

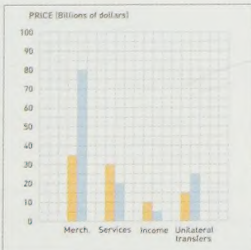
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Chapter Assignment

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Try another sample interactive problem below.

The graph below represents the value of credits and debits in four balance of payments accounts in the economy of Gamros. Blue bars (the right-hand bar in each category) represent debits, and orange bars represent credits. Use the graph to help you answer the questions below.



You can see from the graph above that the total value of Gamros's debits is \_\_\_\_\_ than the value of its credits, and therefore, there is \_\_\_\_\_ money flowing out of Gamros to foreign countries than there is flowing into Gamros. This means that Gamros has a deficit in the \_\_\_\_\_ account.

Fill in the following table based on the credits and debits presented on the graph above. If you are indicating a deficit, be sure to use a negative sign.

< Every assignment can be designated as either practice or graded.

< Students can answer questions before being graded on their work.

< Graded problems count toward the student's final score.

her nephew in Belgium. This would be entered as a \_\_\_\_\_ item \_\_\_\_\_ section of the U.S. current account.

< Terminology and notation match your textbook.

s accounts combined gives the value of \_\_\_\_\_ within the national \_\_\_\_\_ + X. If you rewrite the equation as  $X = GDP - (C + I + G)$ , you can \_\_\_\_\_ of X implies that \_\_\_\_\_. This means that the United \_\_\_\_\_, making it a \_\_\_\_\_.

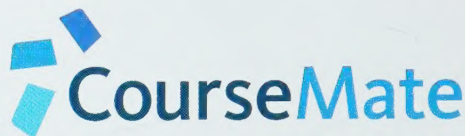
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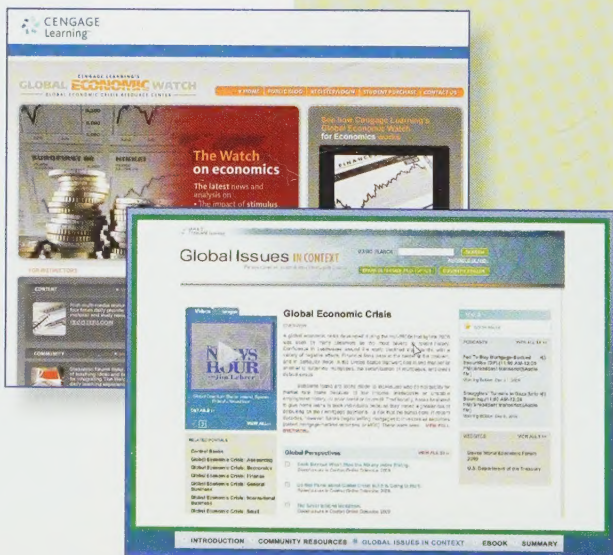
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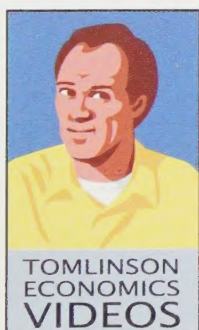
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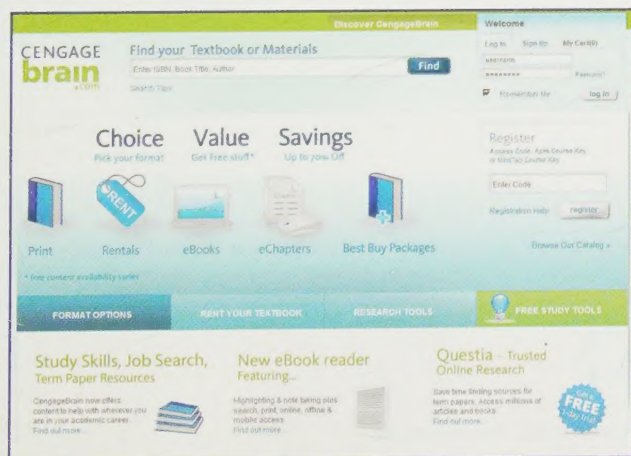


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# microeconomics

NINTH EDITION

**WILLIAM BOYES**

*Arizona State University*

**MICHAEL MELVIN**

*Arizona State University and BlackRock*



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To Melissa, Katie, and Lindsey –W. B.  
To Bettina, Jason, Jeremy, Anna, and Sonia –M. M.







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# suggested outlines for one-term courses\*

| Macroeconomic Emphasis  | Microeconomic Emphasis  | Balanced Micro-Macro  |
|---|---|---|
| <ol style="list-style-type: none"> <li>1. Economics:<br/>The World around You</li> <li>2. Choice, Opportunity Costs, and<br/>Specialization</li> <li>3. Markets, Demand and Supply, and<br/>the Price System</li> <li>4. The Market System and the Private<br/>and Public Sectors</li> <li>5. National Income Accounting</li> <li>6. An Introduction to the Foreign<br/>Exchange Market and the Balance<br/>of Payments</li> <li>7. Unemployment and Inflation</li> <li>8. Macroeconomic Equilibrium:<br/>Aggregate Demand and Supply</li> <li>9. Aggregate Expenditures</li> <li>10. Income and Expenditures<br/>Equilibrium</li> <li>11. Fiscal Policy</li> <li>12. Money and Banking</li> <li>13. Monetary Policy</li> <li>14. Macroeconomic Policy: Tradeoffs,<br/>Expectations, Credibility, and<br/>Sources of Business Cycles</li> <li>15. Macroeconomic Viewpoints: New<br/>Keynesian, Monetarist, and New<br/>Classical</li> <li>16. Economic Growth</li> <li>17. Development Economics</li> <li>18. Globalization</li> <li>34. World Trade Equilibrium</li> <li>35. International Trade Restrictions</li> <li>36. Exchange Rates and Financial Links<br/>between Countries</li> </ol> | <ol style="list-style-type: none"> <li>1. Economics:<br/>The World around You</li> <li>2. Choice, Opportunity Costs, and<br/>Specialization</li> <li>3. Markets, Demand and Supply, and<br/>the Price System</li> <li>4. The Market System and the Private<br/>and Public Sectors</li> <li>19. Elasticity: Demand and Supply</li> <li>20. Consumer Choice</li> <li>21. Supply: The Costs of Doing<br/>Business</li> <li>22. Profit Maximization</li> <li>23. Perfect Competition</li> <li>24. Monopoly</li> <li>25. Monopolistic Competition and<br/>Oligopoly</li> <li>26. Antitrust, Regulation, and Public<br/>Finance</li> <li>27. Market Failures, Government<br/>Failures, and Rent Seeking</li> <li>28. Resource Markets</li> <li>29. The Labor Market</li> <li>30. Capital Markets</li> <li>31. The Land Market and Natural<br/>Resources</li> <li>32. Aging, Social Security, and Health<br/>Care</li> <li>33. Income Distribution, Poverty, and<br/>Government Policy</li> <li>34. World Trade Equilibrium</li> <li>35. International Trade Restrictions</li> </ol> | <ol style="list-style-type: none"> <li>1. Economics:<br/>The World around You</li> <li>2. Choice, Opportunity Costs, and<br/>Specialization</li> <li>3. Markets, Demand and Supply, and<br/>the Price System</li> <li>4. The Market System and the Private<br/>and Public Sectors</li> <li>5. National Income Accounting</li> <li>6. An Introduction to the Foreign<br/>Exchange Market and the Balance<br/>of Payments</li> <li>7. Unemployment and Inflation</li> <li>8. Macroeconomic Equilibrium:<br/>Aggregate Demand and Supply</li> <li>11. Fiscal Policy</li> <li>12. Money and Banking</li> <li>13. Monetary Policy</li> <li>19. Elasticity: Demand and Supply</li> <li>20. Consumer Choice</li> <li>21. Supply: The Costs of Doing<br/>Business</li> <li>22. Profit Maximization</li> <li>28. Resource Markets</li> <li>33. Income Distribution, Poverty, and<br/>Government Policy</li> <li>34. World Trade Equilibrium</li> </ol> |

\* Chapter numbers represent *Economics, 9th ed.* For *Macroeconomics, 9th ed.*, and *Microeconomics, 9th ed.*, see the conversion chart in the Brief Contents section.





# preface

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In the first edition of *Microeconomics*, we integrated a global perspective with traditional economic principles to give students a framework to understand the globally developing economic world. Events since then have made this approach even more imperative. In the 1990s, the Soviet Union disintegrated and newly independent nations emerged. Much of Latin America was turning toward free markets and away from government controls. But by 2005, several of these nations were turning back—away from free markets. Hugo Chavez and Evo Morales were guiding Venezuela and Bolivia away from free markets and toward government-run and controlled economies. Vladimir Putin was driving Russia toward more government control. Other events were making the world seem very small: North Korea was testing nuclear weapons, Somalia was embroiled in a civil war, terrorism was prevalent in nations around the world, and much of Africa remained mired in poverty. In 2007, the interconnectedness of nations was once again highlighted when the world fell into a recession created by the housing collapse in the United States. When economic growth returned in the summer of 2009, it was slow and unemployment remained high. In 2011 the European Union and the eurozone are facing severe challenges as Greece, Portugal, Spain, Italy, and Ireland face debt burdens that some believe will not be repaid.

Students and instructors have embraced the idea that the economies of countries are interrelated and that this should be made clear in the study of economics. *Microeconomics* gives students the tools they need to make connections between the economic principles they learn and the now-global world they live in.

In this edition, we continue to refine and improve the text as a teaching and learning instrument while expanding its international base by updating and adding examples related to global economics.

## Changes in the Ninth Edition

The ninth edition of *Microeconomics* has been thoroughly updated and refined, taking into account the events of 2008–2011. A detailed account of all the additions, deletions, and modifications can be found in the Transition Guide in the *Instructor's Resource Manual* (found on the instructor's site at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes) and also on the Instructor's Resource CD).

## Revised Microeconomic Coverage

The principal objective of the microeconomic material is to enable students to see the forest while wandering around in the trees; to learn the fundamentals while seeing their applicability to current events. Changes in the ninth edition have been made to further that objective. The debate about whether governments should intervene in economies is further developed in Chapters 12 and 13. Additionally, in Chapter 12 a discussion of the Economic Freedom Index has been added. In Chapter 11, the discussion of kinked demand curve has been eliminated and additional game theory material has been included. Chapter 18 on aging and health care has been updated and a discussion of why health care costs continue rising is included. In addition, a market for human organs is discussed. In Chapter 19, a detailed examination of income distribution has been included. In every chapter examples have been updated and global applications provided.

## Successful Features Retained from the Eighth Edition

In addition to the considerable updating and revising we've done for the ninth edition, there are several features preserved from the previous edition that we think instructors will find interesting.

### Enhanced Student Relevance

With all of the demands on today's students, it's no wonder that they resist spending time on a subject unless they see how the material relates to them and how they will benefit from mastering it. We incorporate features throughout the text that show economics as the relevant and necessary subject we know it to be.

**Real-World Examples** Students are rarely intrigued by unknown manufacturers or service companies. Our text talks about people and firms that students recognize. We describe business decisions made by McDonald's and Wal-Mart, and by the local video store or café. We discuss standards of living around the world, comparing the poverty of sub-Saharan Africa to the wealth of the industrial nations. We discuss policies applied to real-world economic issues. We talk about political, environmental, and other social issues. These examples grab students' interest. Reviewers have repeatedly praised the use of novel examples to convey economic concepts.

**Economic Insight Boxes** These brief boxes use contemporary material from current periodicals and journals to illustrate or extend the discussion in the chapter. By reserving interesting but more technical sidelights for boxes, we lessen the likelihood that students will be confused or distracted by issues that are not critical to understanding the chapter. By including excerpts from articles, we help students move from theory to real-world examples. And by including plenty of contemporary issues, we guarantee that students will see how economics relates to their own lives.

**Economically Speaking Boxes** The objective of the principles course is to teach students how to translate to the real world the predictions that come out of economic models, and to translate real-world events into an economic model in order to analyze and understand what lies behind the events. The Economically Speaking boxes present students with examples of this kind of analysis. Students read an article at the end of each chapter. The commentary that follows shows how the facts and events in the article translate into a specific economic model or idea, thereby demonstrating the relevance of the theory. Nearly two-thirds of the articles and commentaries are new to the ninth edition, and cover such current events as U.S. trade with China, the collapse of consumer confidence during the financial crisis, illegal immigration, Venezuela's redistribution of wealth, high gasoline prices, the impact of the government's bailout of large companies, the true effects of "fair trade" coffee, and the change in India's permit raj.

**Global Business Insight Boxes** These boxes link business events and developments around the world to the economic concepts discussed in the main text of the chapters. Topics include such basic micro- and macroeconomic issues as global competition, resource pricing, and foreign exchange.



## An Effective and Proven System of Teaching and Learning Aids

This text is designed to make teaching easier by enhancing student learning. Tested pedagogy motivates students, emphasizes clarity, reinforces relationships, simplifies review, and fosters critical thinking. And, as we have discovered from reviewer and user feedback, this pedagogy works.

**In-Text Referencing System** Sections are numbered for easy reference and to reinforce hierarchies of ideas. Numbered section heads serve as an outline of the chapter, allowing instructors flexibility in assigning reading and making it easy for students to find topics to review. Each item in the key terms list and summary at the end of the chapter refers students back to the appropriate section number.

The section numbering system appears throughout the Boyes and Melvin ancillary package; *Study Guides* and *Instructor's Resource Manual* are both organized according to the same system.

**Fundamental Questions** These questions help to organize the chapter and highlight those issues that are critical to understanding. Each fundamental question also appears in the margin next to the related text discussion and, with brief answers, in the chapter summaries. A fuller discussion of and answer to each of these questions may be found in the *Study Guides* that are available as supplements to this text. The fundamental questions also serve as one of several criteria used to categorize questions in the *Test Banks*.

**Preview** This motivating lead-in sets the stage for the chapter. Much more so than a road map, it helps students identify real-world issues that relate to the concepts that will be presented.

**Recaps** Briefly listing the main points covered, a recap appears at the end of each major section within a chapter. Students are able to quickly review what they have just read before going on to the next section.

**Summary** The summary at the end of each chapter is organized along two dimensions. The primary organizational device is the list of fundamental questions. A brief synopsis of the discussion that helps students to answer those questions is arranged by section below each of the questions. Students are encouraged to create their own links among topics as they keep in mind the connections between the big picture and the details that make it up.

**Comments** Found in the text margins, these comments highlight especially important concepts, point out common mistakes, and warn students of common pitfalls. They alert students to parts of the discussion that they should read with particular care.

**Key Terms** Key terms appear in bold type in the text. They also appear with their definition in the margin and are listed at the end of the chapter for easy review. All key terms are included in the Glossary at the end of the text.

## Friendly Appearance

Economics can be intimidating; this is why we've tried to keep *Microeconomics 9th edition* looking friendly and inviting. The one-column design and ample white space in this text provide an accessible backdrop. More than 300 figures rely on well-developed

pedagogy and consistent use of color to reinforce understanding. Striking colors were chosen to enhance readability and provide visual interest. Specific curves were assigned specific colors, and families of curves were assigned related colors.

Annotations on the art point out areas of particular concern or importance. Students can see exactly which part of a graph illustrates a shortage or a surplus, a change in consumption, or a consumer surplus. Tables that provide data from which graphs are plotted are paired with their graphs. Where appropriate, color is used to show correlations between the art and the table, and captions clearly explain what is shown in the figures and link them to the text discussion.

The color photographs not only provide visual images but make the text appealing. These vibrant photos tell stories as well as illustrate concepts, and lengthy captions explain what is in the photos, again drawing connections between the images and the text discussion.

## Thoroughly International Coverage

Students understand that they live in a global economy; they can hardly shop, watch the news, or read a newspaper without stumbling upon this basic fact. International examples are presented in every chapter but are not merely added on, as is the case with many other texts. By introducing international effects on demand and supply in Chapter 3 and then describing in a nontechnical manner the basics of the foreign exchange market and the balance of payments in Chapter 6, we are able to incorporate the international sector into the economic models and applications wherever appropriate thereafter. Because the international content is incorporated from the beginning, students develop a far more realistic picture of the national economy; as a result, they don't have to alter their thinking to allow for international factors later on. The three chapters that focus on international topics at the end of the text allow those instructors who desire to delve much more deeply into international issues to do so.

The global applicability of economics is emphasized by *using traditional economic concepts to explain international economic events and using international events to illustrate economic concepts that have traditionally been illustrated with domestic examples*. Instructors need not know the international institutions in order to introduce international examples, since the topics through which they are addressed are familiar; for example, price ceilings, price discrimination, expenditures on resources, marginal productivity theory, and others.

Uniquely international elements of the microeconomic coverage in the text include:

- The treatment of the international sector as an economic participant and the inclusion of net exports as early as Chapter 4
- Extensive analyses of the effects of trade barriers, tariffs, and quotas
- An examination of strategic trade
- An examination of dumping as a special case of price discrimination
- The identification of problems faced by multinational firms
- A comparison of behavior, results, and institutions among nations with respect to consumption, production, firm size, government policies toward business, labor markets, health care, income distribution, environmental policy, and other issues

## Modern Microeconomic Organization and Content

Instructors often face a quandary when teaching microeconomic material. They want students to understand the basic theories of economics and the powerful intuition that thinking like an economist can provide, but they also want to enlist students' attention with real-life, current issues. In the ninth edition of *Microeconomics*, theory is never far



away from applications. One of the primary lessons of microeconomics is captured in Bastiat's "Broken Window Fallacy." When it seems that some policy or some action will solve a certain problem, what we often do is focus on that problem and fail to examine the unseen—what is the possible effect of the policy? Will the policy solve the problem but actually create greater problems? For instance, students may think that a ban of some behavior might be beneficial but they fail to see that the ban may harm others more than help those it is supposed to help. In this text we ensure that students can see why environmental issues such as pollution and the razing of rain forests occur but we also teach about the costs and benefits of various proposed solutions to these problems. Students can see why incomes are unequal within a country and among countries and can learn about the costs and benefits of attempting to reduce inequality. Students can see why collusion occurs among competing firms and what the costs and benefits are of minimizing such behavior through antitrust action or regulation.

Part Two presents basic concepts such as elasticity, consumer behavior, and costs of production. Parts Three and Four both begin with overview chapters (Chapter 8 on profit maximization and Chapter 14 on resource markets). These overviews give students a chance to look at the big picture before delving into details they often find confusing. Chapter 8, for instance, gives students an intuitive overview of market structures before they explore each type of structure in more detail in succeeding chapters. Chapter 8 lightens the load that the more detailed chapters have to bear, easing students into the market-structure material. Traditional topics are covered in the separate market structure chapters, Chapters 9 to 11, but the coverage is also modern, including such topics as strategic behavior, price discrimination, nonprice competition, and the economics of information. Having fought their way first through the cost curves and then the market structures, students often complain that they do not see the relevance of that material to real-world situations. The intuitive overview chapter alleviates some of that frustration.

## A Complete Teaching and Learning Package

In today's market no book is complete without a full complement of ancillaries. Those instructors who face huge lecture classes find good PowerPoint slides and a large variety of reliable test questions to be critical instructional tools. Those who teach online in distance or hybrid courses need reliable course management systems with built-in assignments and resource materials. Other instructors want plenty of options available to their students for review, application, and remediation. All of these needs are addressed in the Boyes and Melvin supplements package. And to foster the development of consistent teaching and study strategies, the ancillaries pick up pedagogical features of the text—such as the fundamental questions—wherever appropriate.

## Support for Instructors

### Instructor's Resource Manual (IRM)

Patricia Diane Nipper has produced a manual that will streamline preparation for both new and experienced faculty. Preliminary sections cover class administration, alternative syllabi, and an introduction to the use of cooperative learning in teaching the principles of economics.

The *IRM* also contains a detailed chapter-by-chapter review of all the changes made in the ninth edition. This Transition Guide should help instructors more easily move from the use of the eighth edition to this new edition.

Each chapter of the *IRM* contains an overview that describes the content and unique features of the chapter and the objectives that students will need to master in order to succeed with later chapters; the chapter's fundamental questions and key terms; a lecture outline with teaching strategies—general techniques and guidelines, essay topics, and other hints to enliven classes; opportunities for discussion; answers to every end-of-chapter exercise; answers to *Study Guide* homework questions; and active learning exercises.

## Testing Materials

**Printed Test Banks** Two separate *Test Banks* for *Macroeconomics* and *Microeconomics*, edited and revised by Mike Ryan of Gainesville State College and Chin-Chyuan Tai of Averett University, are available with this edition of *Economics*. In all, more than 4,000 test items, approximately 20 percent of which are new to this edition, provide a wealth of material for classroom testing. Features include:

- Multiple choice, true/false, and essay questions in every chapter
- Questions new to this edition marked for easy identification
- An increased number of analytical, applied, and graphical questions
- The identification of all test items according to topic, question type (factual, interpretive, or applied), level of difficulty, and applicable fundamental question

## ExamView

This testing software contains all of the questions in the printed test bank. This program is an easy-to-use test creation software compatible with Microsoft Windows. Instructors can add or edit questions, instructions, and answers; and select questions by previewing them on the screen, selecting them randomly, or selecting them by number. Instructors can also create and administer quizzes online, whether over the Internet, a local area network (LAN), or a wide area network (WAN). The ExamView testing software is available on the Instructor's Resource CD.

## Instructor Online Resources

The Boyes and Melvin ninth edition provides a rich store of teaching resources for instructors online at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes). Instructors will need to sign up at the site for a username and password to get onto the password-protected parts of the site. This site includes a variety of support materials to help you organize, plan, and deliver your lectures; assign and grade homework; and stay up-to-date with current economics news. Here you'll find a thoroughly updated set of multimedia PowerPoint slides covering key points in each chapter, with graphs, charts, and photos. An online version of the *Instructor's Resource Manual* contains solutions to end-of-chapter exercises and discussion questions.

## Aplia Online Learning Platform

Founded in 2000 by economist and professor Paul Romer in an effort to improve his own economics courses at Stanford, Aplia is the leading online learning platform for economics. Aplia provides a rich online experience that gets students involved and gives instructors the tools and support they need. The integrated Aplia courses offered for Boyes and Melvin include math review/tutorials, news analyses, and online homework assignments correlated to the relevant Boyes and Melvin text. In addition, a digital version of the text



is embedded in the course to make it easy for students to access the text when completing assignments. Instructors should consult their South-Western/Cengage Learning sales representative for more information on how to use Aplia with this text.

## Support for Students

### Student Online Resources

The student companion website, located at [www.cengagebrain.com](http://www.cengagebrain.com), lets students continue their learning at their own pace with practice quizzes, chapter summaries, online exercises, and flashcards, among other online resources.

## Acknowledgments

Writing a text of this scope is a challenge that requires the expertise and efforts of many. We are grateful to our friends and colleagues who have so generously given their time, creativity, and insight to help us create a text that best meets the needs of today's students.

We'd especially like to thank the many reviewers of *Microeconomics* listed on the following pages who weighed in on key issues throughout the development of each edition. Their comments have proved invaluable in revising this text. Unsolicited feedback from current users has also been greatly appreciated.

We would also like to thank Patricia Diane Nipper of Southside Virginia Community College for her work on the ninth and previous editions of the *Instructor's Resource Manual*. Thanks also to Chin-Chyuan Tai of Averett University and Mike Ryan of Gainesville State College for their intensive work on the *Test Banks*, and for their attention to the accuracy of the text. Carol Conces of UC Berkeley provided excellent research assistance in revising the 9th edition.

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Finally, we wish to thank our families and friends. The inspiration they provided through the conception and development of this book cannot be measured but certainly was essential.

Our students at Arizona State University continue to help us improve the text through each edition; their many questions have given us invaluable insight into how best to present this intriguing subject. It is our hope that this textbook will bring a clear understanding of economic thought to many other students as well. We welcome any feedback for improvements.

W. B. M. M.

## Reviewers

Okechukwu Dennis Anyamele  
*Jackson State University—Jackson, MS*

David Black  
*University of Toledo—Toledo, OH*

Gary Bogner  
*Baker College-Muskegon—Muskegon, MI*

Rick Boulware  
*University of South Carolina—Beaufort Beaufort, SC*

Bradley Braun  
*University of Central Florida—Orlando, FL*

William S. Brewer  
*Genesee Community College—Batavia, NY*

Gregory Brown  
*Martin Community College—Williamston, NC*

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*Salisbury State University—Salisbury, MD*
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*Collin County Community—College Plano, TX*
- Valerie A. Collins  
*Colorado Mountain College—Glenwood Springs, CO*
- Wilfrid W. Csaplar, Jr.  
*Southside Virginia Community College—Keysville, VA*
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*Alma College—Alma, MI*
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*University of Connecticut—Storrs, CT*
- Stephen B. Davis  
*Valley City State University—Valley City, ND*
- Lynne Pierson Doti  
*Chapman University—Orange, CA*
- Raymond J. Egan  
*WA (Retired, formerly at Pierce College)—Lakewood, WA*
- Martha Field  
*Greenfield Community College—Greenfield, MA*
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- Davis Folsom  
*University of South Carolina, Beaufort—Beaufort, SC*
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- Bradley Garton  
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*Villa Julie College—Stevenson, MD*
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- Karen Rapp Schultes  
*University of Michigan—Dearborn, MI*
- Gerald Scott  
*Florida Atlantic University—Boca Raton, FL*
- J. Richard Sealscott  
*Northwest State Community College—Archbold, OH*



Steve Seteroff

*Chapman University College—Silverdale, WA*

James R. Shemwell

*Mississippi County Community College—Blytheville, AR*

Richard Skolnik

*SUNY-Oswego—Oswego, NY*

Scott F. Smith

*University at Albany, State University of New York—  
Albany, NY*

Thom Smith

*Hill College—Hillsboro, TX*

John Somers

*Portland Community College—Sylvania Portland, OR*

John P. Speir Jr.

*The University of Hartford—West Hartford, CT*

John J. Spitzer

*State University of New York College at Brockport—  
Brockport, NY*

Chin-Chyuan Tai

*Averett University—Danville, VA*

Rob Verner

*Ursuline College—Pepper Pike, OH*

Michele T. Villinski

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## CHAPTER 1

# Economics: The World around You

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### FUNDAMENTAL QUESTIONS

- 1 Why study economics?
- 2 What is economics?
- 3 What is the economic way of thinking?

**A**mericans today are more educated than ever before. Today, about 31 percent of Americans aged 25 or older hold a college (bachelor's or associate's) degree, whereas 20 years ago, only 19 percent of Americans held a similar degree. Nearly 15.5 million Americans (5 percent of the population) are currently attending college, and over 50 percent of Americans aged 18 to 22 are currently enrolled in a degree program.

Why do people go to college? College has not gotten any cheaper—indeed, tuition and other costs associated with college have risen much more rapidly than average income. Perhaps it is because college is more valuable today than it was in the past. In the 1990s, technological change and increased international trade placed a premium on a college education; more and more jobs required the skills acquired in college. As a result, the wage disparity between college-educated and



non-college-educated workers rose fairly rapidly in the 1990s. Those with a college degree could expect to make about 45 percent more than those without a college degree. Since 2001, however, this differential has actually declined. Outsourcing of skilled jobs to China and India may be part of the explanation, and a larger increase in the number of college-educated people than the increase in the jobs requiring college skills may have kept wages from rising. The number of college-trained workers in the United States has grown by 32 percent over the past 10 years, compared with only an 8 percent rise for all other education levels. Still, even though the differential has been declining, college-educated people earn nearly twice as much as people without college degrees over their lifetimes. But college-educated people also often have large student loans they must repay. The net differential depends on what people major in and how long they take to finish their education.

Why are you attending college? Perhaps you've never really given it a great deal of thought—your family always just assumed that college was a necessary step after high school; perhaps you analyzed the situation and decided that college was better than the alternatives. Whichever approach you took, you were practicing economics. You were examining alternatives and making choices. This is what economics is about.



Why do the citizens of different countries have different standards of living? Why is the difference between rich and poor much greater in emerging nations than it is in the industrial nations? Answers to questions like these emerge in your study of economics. In this photo, a shantytown is shown next to new, modern apartment buildings and other structures.



## 1 Why study economics?

# 1. Why Study Economics?

Why are you studying economics? Is it because you are required to, because you have an interest in it, because you are looking for a well-paying job, or because you want to do something to help others? All of these are valid reasons. The college degree is important to your future living standards; economics is a fascinating subject, as you will see; an economics degree can lead to a good job; and understanding economics can help policymakers, charities, and individuals think about better ways to help the unfortunate.

## 1.a. The Value of a Degree

What is the difference between a high school diploma and a medical degree? About \$3.2 million (U.S.), says the U.S. Census Bureau. Someone whose education does not go beyond high school and who works full time can expect to earn about \$1.2 million between the ages of 25 and 64. Graduating from college and earning an advanced degree translate into much higher lifetime earnings: an estimated \$4.4 million for doctors, lawyers, and others with professional degrees; \$2.5 million for those with a master's degree; and \$2.1 million for college graduates.

Putting money into a four-year college education turns out to be a better financial investment than putting the same money into the stock market, even before the 2006–2009 stock-market collapse. The rate of return on the money spent to earn a bachelor's degree is 12 percent per year, compared with the long-run average annual return on stocks of 7 percent.

In the 1970s, when the information age was young, kids from poorer, less educated families were catching up to kids from more affluent families when it came to earning college degrees. But now the gap between rich and poor is widening. Students in the poorest quarter of the population have an 8.6 percent chance of getting a college degree, whereas students in the top quarter have a 74.9 percent chance. The difference between being college-educated and not extends to more than just income. Divorce rates for college grads are plummeting, but they are not for everyone else. The divorce rate for high school grads is now twice as high as that of college grads. High school grads are twice as likely to smoke as college grads, they are much less likely to exercise, and they are likely to live shorter and less healthy lives.

Once you choose to go to college, how do you choose what to study? A bachelor's degree in economics prepares you for a career in any number of occupations—in business, finance, banking, the nonprofit sector, journalism, international relations, education, or government. Graduates find positions at investment banking companies and public utilities, in real estate and international relations, in government and private organizations. An economics degree is also excellent preparation for graduate study—in law, finance, business, economics, government, public administration, environmental studies, health-care administration, labor relations, urban planning, diplomacy, and other fields.

## 1.b. What Is Economics?

Economists are concerned with why the world is what it is—it is the study of human behavior. In 1990, the Soviet Union collapsed, setting countries free throughout Eastern Europe and Asia, because of economics. The nations of Latin America are struggling with progress and development because of economics. It is estimated that somewhere between 11 and 20 million people live in the United States illegally, and they do so because of economics. In 2011, many of the nations of the Mideast underwent turmoil as dictators were thrown out. This also stems from economics, and, in fact, every issue in the news today concerns economics. It is a broad, fascinating field of study that deals with every aspect of life.

Economics is often counterintuitive. In fact, economics is probably best defined as the study of *unintended consequences*. When you study economics, you learn that there are costs to everything—there is no free lunch. This is the logic of economics that those who have not studied economics may fail to understand. To give you an idea of how economics is often counterintuitive, consider the story known as “The Broken Window Fallacy,” introduced in 1850 by French economist Frédéric Bastiat. A baker had a beautiful front window that allowed him to show off his delights. One day, a punk kid heaved a rock through the window, shattering it. The baker and several local business owners



ran out through their doors and began crying about the demise of society and the harm such hooligans do. Then, one man said, “Wait, think about it. This young man actually helped us out. By breaking the window, he made the baker hire a glazier to replace the window. That creates a job for the glazier who then spends his income and this helps others.” Bastiat notes that this ignores what you don’t see. You see the broken window and the glazier’s job, but you don’t see what would have happened had the window not been shattered. The baker might have purchased a new pair of boots, thereby creating a job for the boot maker. As a result of the broken window, the boot maker is made worse off. Economics attempts to focus on the unseen as well as the seen; it is for this reason that economics often seems counterintuitive.

Your study of economics will be interesting and challenging. It will challenge some beliefs that you now hold. It will also help you build skills that will be of value to you in your life and in whatever occupation you choose.



## 2 What is economics?

# 2. The Definition of Economics

What is economics? It is the study of how *scarcity* and *unlimited wants* lead to certain predictable human behaviors. People have unlimited wants—they always want more goods and services than they have or can purchase with their incomes; they want more time; they want more love, or health care, or chocolate cake, or coffee. Whether they are wealthy or poor, what they have is never enough. Since people do not have everything they want, they have to make choices. The choices they make and the manner in which these choices are made explain much of why the real world is what it is.

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## 2.a. Scarcity

Scarcity is the reason the study of economics exists—without scarcity, there would be no need to worry about who gets what. Everyone would have everything that he or she wants. **Scarcity** of something means that there is not enough of that item to satisfy everyone who wants it. Any item that costs something is scarce. If it were not scarce, it would be free, and you could have as much as you wanted without paying for it. Anything with a price on it is called an **economic good**. An economic good refers to *goods and services*—where goods are physical products, such as books or food, and services are nonphysical products, such as haircuts or golf lessons.

**2.a.1. Free Goods, Economic Bads, and Resources** If there is enough of an item to satisfy wants, even at a zero price, the item is said to be a **free good**. It is difficult to think of examples of free goods. At one time people referred to air as free, but with air pollution control devices and other costly activities directed toward the maintenance of air quality standards, *clean* air, at least, is not a free good.

An **economic bad** is anything that you would pay to get rid of. It is not so hard to think of examples of bads: pollution, garbage, and disease fit the description.

Some goods are used to produce other goods. For instance, to make chocolate chip cookies, we need flour, sugar, chocolate chips, butter, our own labor, and an oven. To distinguish between the ingredients of a good and the good itself, we call the ingredients **resources**. (Resources are also called **factors of production** and **inputs**; the terms are interchangeable.) The ingredients of the cookies are the resources, and the cookies are the goods.

Economists have classified resources into three broad categories: land, labor, and capital.

### scarcity

The shortage that exists when less of something is available than is wanted at a zero price.

### economic good

Any item that is scarce.

### free good

A good for which there is no scarcity.

### economic bad

Any item for which we would pay to have less.

### resources, factors of production or inputs

Goods used to produce other goods, i.e., land, labor, and capital.

1. **Land** includes all natural resources, such as minerals, timber, and water, as well as the land itself.
2. **Labor** refers to the physical and intellectual services of people, including the training, education, and abilities of the individuals in a society.
3. **Capital** refers to products such as machinery and equipment that are used in production. You will often hear the term *capital* used to describe the financial backing for some project or the stocks and bonds used to finance some business. This common usage is not incorrect, but it should be distinguished from the physical entity—the machinery and equipment and the buildings, warehouses, and factories. Thus we refer to stocks and bonds as *financial capital* and to the physical entity as capital.

People obtain income by selling their resources or the use of their resources. Owners of land receive *rent*; people who provide labor services are paid *wages*; and owners of capital receive *interest*.

The income that resource owners acquire from selling the use of their resources provides them with the ability to buy goods and services. Producers use the money received from selling their goods to pay for the resource services.

## 2.b. Choices

Scarcity means that people have to make choices. People don't have everything they want, and they do not have the time or the money to purchase everything they want. When people choose some things, they have to give up, or forgo, other things. *Economics is the study of how people choose to use their scarce resources to attempt to satisfy their unlimited wants.*

## 2.c. Rational Self-Interest

**Rational self-interest** is the term that economists use to describe how people make choices. It means that people will make the choices that, at the time and with the information they have at their disposal, will give them the greatest amount of satisfaction, make them the happiest, or provide them the greatest comfort.

You are probably reading this book because you chose to attend college. Many of the people in your age group chose not to attend college. All of you made rational choices based on what you perceived to have been in your best interest. How could it be in your best interest to do one thing and in another person's best interest to do exactly the opposite? Each person has unique goals and attitudes and faces different costs. Although your weighing of the alternatives came down on the side of attending college, other people weighed similar alternatives and came down on the side of not attending college. Both decisions were rational because in both cases the individual compared alternatives and selected the option that the *individual* thought was in his or her best interest.

It is important to note that rational self-interest depends on the information at hand and the individual's perception of what is in his or her best interest. Even though the probability of death in an accident is nearly 20 percent less if seat belts are worn, many people choose not to use them. Are these people rational? The answer is yes. Perhaps they do not want their clothes wrinkled, or perhaps seat belts are just too inconvenient, or perhaps they think the odds of getting in an accident are just too small to worry about. Whatever the reason, these people are choosing the option that at the time gives them the greatest satisfaction. *This is rational self-interest.* Economists sometimes use the term *bounded rationality* to emphasize the point that people do not have perfect knowledge or perfect insight. In this book we simply use the term *rational* to refer to the comparison of costs and benefits.

### land

All natural resources, such as minerals, timber, and water, as well as the land itself.

### labor

The physical and intellectual services of people, including the training, education, and abilities of the individuals in a society.

### capital

Products such as machinery and equipment that are used in production.

### rational self-interest

The means by which people choose the options that give them the greatest amount of satisfaction.



Economists think that most of the time most human beings are weighing alternatives, looking at costs and benefits, and making decisions in a way that they believe makes them better off. This is not to say that economists look upon human beings as androids who lack feelings and are only able to carry out complex calculations like a computer. Rather, economists believe that people's feelings and attitudes enter into their comparisons of alternatives and help determine how people decide that something is in their best interest.

Human beings are self-interested, *not selfish*. Selfish has a negative connotation, saying that people have a concern only for themselves. People do contribute to charitable organizations and help others; people do make individual sacrifices because those sacrifices benefit their families or people that they care about; soldiers do risk their lives to defend their country. All these acts are made in the name of rational self-interest.

## RECAP

1. Scarcity exists when people want more of an item than exists at a zero price.
2. Goods are produced with resources (also called factors of production and inputs). Economists have classified resources into three categories: land, labor, and capital.
3. Choices have to be made because of scarcity. People cannot have or do everything that they desire all the time.
4. People make choices in a manner known as rational self-interest; people make the choices that, at the time and with the information they have at their disposal, will give them the greatest satisfaction.



- 3 What is the economic way of thinking?

### positive analysis

Analysis of what is.

### normative analysis

Analysis of what ought to be.

*Conclusions based on opinion or value judgments do not advance one's understanding of events.*

## 3. The Economic Approach

Economists often refer to the “economic approach” or to “economic thinking.” By this, they mean that the principles of scarcity and rational self-interest are used in a specific way to search out answers to questions about the real world.

### 3.a. Positive and Normative Analysis

In applying the principles of economics to questions about the real world, it is important to avoid imposing your opinions or value judgments on others. Analysis that does not impose the value judgments of one individual on the decisions of others is called **positive analysis**. If you demonstrate that unemployment in the automobile industry in the United States rises when people purchase cars produced in other countries instead of cars produced in the United States, you are undertaking positive analysis.

However, if you claim that there ought to be a law to stop people from buying foreign-made cars, you are imposing your value judgments on the decisions and desires of others. That is not positive analysis. It is, instead, **normative analysis**. *Normative means “what ought to be”; positive means “what is.”* If you demonstrate that the probability of death in an automobile accident is 20 percent higher if seat belts are not worn, you are using positive analysis. If you argue that there should be a law requiring seat belts to be worn, you are using normative analysis.

### 3.b. Common Mistakes

Why are so many items sold for \$2.99 rather than \$3? Most people attribute this practice to ignorance on the part of others: “People look at the first number and round to it—they see \$2.99 but think \$2.” Although this reasoning may be correct, no one admits to such behavior when asked. A common error in the attempt to understand human behavior is

to argue that other people do not understand something or are stupid. Instead of relying on rational self-interest to explain human behavior, ignorance or stupidity is called on.

Another common mistake in economic analysis, called the **fallacy of composition**, is the error of attributing what applies in the case of one to the case of many. If one person in a theater realizes that a fire has broken out and races to the exit, that one person is better off. If we assume that a thousand people in a crowded theater would be better off if they all behaved exactly like the single individual, we would be committing the mistake known as the fallacy of composition. For example, you reach an intersection just as the light switches to yellow. You reason that you can make it into the intersection before the light turns red. However, others reason the same way. Many people enter the intersection with the yellow light; it turns red, and traffic in the intersection is congested. The traffic going the other way can't move. You correctly reasoned that you alone could enter the intersection on the yellow light and then move on through. But it would be a fallacy of composition to assume that many drivers could enter the intersection and pass on through before the intersection is congested.

The mistaken interpretation of **association as causation** occurs when unrelated or coincidental events that occur at about the same time are believed to have a cause-and-effect relationship. For example, the result of the football Super Bowl game is sometimes said to predict how the stock market will perform. According to this “theory,” if the NFC team wins, the stock market will rise in the new year, but if the AFC team wins, the market will fall. This bit of folklore is a clear example of confusion between causation and association. Simply because two events seem to occur together does not mean that one causes the other. Clearly, a football game cannot cause the stock market to rise or fall. For another example, on Gobbler's Knob, Punxsutawney, Pennsylvania, at 7:27 A.M. on February 2, Punxsutawney Phil saw his shadow. Six more weeks of winter followed. However, whether the sun was or was not hidden behind a cloud at 7:27 A.M. on February 2 had nothing to do with causing a shortened or extended winter. Groundhog Day is the celebration of the mistake of attributing association as causation.

#### **fallacy of composition**

The mistaken assumption that what applies in the case of one applies to the case of many.

#### **association as causation**

The mistaken assumption that because two events seem to occur together, one causes the other.

### 3.c. Microeconomics and Macroeconomics

Economics is the study of how people choose to allocate their scarce resources among their unlimited wants and involves the application of certain principles—scarcity, choice, and rational self-interest—in a consistent manner. The study of economics is usually separated into two general areas, *microeconomics* and *macroeconomics*. **Microeconomics** is the study of economics at the level of the individual economic entity: the individual firm, the individual consumer, and the individual worker. In **macroeconomics**, rather than analyzing the behavior of an individual consumer, we look at the sum of the behaviors of all consumers together, which is called the consumer sector or household sector. Similarly, instead of examining the behavior of an individual firm, in macroeconomics we examine the sum of the behaviors of all firms, called the business sector.

Topics such as whether the president's stimulus plan is working, whether government debt is beneficial or not, whether the Federal Reserve (the central bank of the United States) should control interest rates or the money supply, and whether the Federal Reserve has been too loose or too tight with its policies, as well as the effect of changing exchange rates on the economy, are discussed in macroeconomics. How a firm manages during a recession, whether to raise or lower prices, whether to alter the brand or the advertising, whether people will purchase slightly less or significantly less gasoline as gas prices rise, and the effect on firms and employees of increased government regulations are generally microeconomic topics. Remember that the focus in microeconomics is the individual—the individual firm, employee, customer, government official, and so forth—while the focus in macroeconomics is on the entire consumer sector, business sector, government sector, and global sector.

#### **microeconomics**

The study of economics at the level of the individual.

#### **macroeconomics**

The study of the economy as a whole.



## RECAP

1. The objective of economics is to understand why the real world is the way it is.
2. Positive analysis refers to what is, while normative analysis refers to what ought to be.
3. Assuming that others are ignorant, the fallacy of composition, and interpreting association as causation are three commonly made errors in economic analysis.
4. The study of economics is typically divided into two parts, macroeconomics and microeconomics.

## SUMMARY

### 1. Why study economics?

- The study of economics may be the road to a better job and will add skills that have value to you in your life and in your occupation. §1
- Economics is interesting; it might be called the study of unintended consequences. §1.b

### 2. What is economics?

- The resources that go into the production of goods are land, labor, and capital. §2.a.1
- Economics is the study of how people choose to allocate scarce resources to satisfy their unlimited wants. §2.b
- Scarcity is universal; it applies to anything people would like more of than is available at a zero price. Because of scarcity, choices must be made, and

these choices are made in a way that is in the decision maker's rational self-interest. §2.a, 2.b, 2.c

- People make choices that, at the time and with the information at hand, will give them the greatest satisfaction. §2.c

### 3. What is the economic way of thinking?

- Positive analysis is analysis of what is; normative analysis is analysis of what ought to be. §3.a
- Assuming that others are ignorant, the fallacy of composition, and interpreting association as causation are three commonly made errors in economic analysis. §3.b
- The study of economics is typically divided into two parts, macroeconomics and microeconomics. §3.c

## KEY TERMS

association as causation, 7  
capital, 5  
economic bad, 4  
economic good, 4  
factors of production, 4  
fallacy of composition, 7

free good, 4  
inputs, 4  
labor, 5  
land, 5  
macroeconomics, 7  
microeconomics, 7

normative analysis, 6  
positive analysis, 6  
rational self-interest, 5  
resources, 4  
scarcity, 4

## EXERCISES

1. Which of the following are economic goods? Explain why each is or is not an economic good.
  - a. steaks
  - b. houses
  - c. cars
  - d. garbage
  - e. T-shirts
2. Many people go to a medical doctor every time they are ill; others never visit a doctor. Explain how

- human behavior could include such opposite behaviors.
3. Erin has purchased a \$35 ticket to a Dave Matthews concert. She is invited to a send-off party for a friend who is moving to another part of the country. The party is scheduled for the same day as the concert. If she had known about the party before she bought the concert ticket, she would have chosen to attend the party. Will Erin choose to attend the concert? Explain.
  4. It is well documented in scientific research that smoking is harmful to health. Smokers have higher incidences of coronary disease, cancer, and other catastrophic illnesses. Knowing this, about 30 percent of young people begin smoking, and about 20 percent of the U.S. population smokes. Are the people who choose to smoke irrational? What do you think of the argument that we should ban smoking in order to protect these people from themselves?
  5. Indicate whether each of the following statements is true or false. If the statement is false, change it to make it true.
    - a. Positive analysis imposes the value judgments of one individual on the decisions of others.
    - b. Rational self-interest is the same thing as selfishness.
    - c. An economic good is scarce if it has a positive price.
    - d. An economic bad is an item that has a positive price.
    - e. A resource is an ingredient used to make factors of production.
  6. Are the following statements normative or positive? If a statement is normative, change it to a positive statement.
    - a. The government should provide free tuition to all college students.
    - b. An effective way to increase the skills of the workforce is to provide free tuition to all college students.
    - c. The government must provide job training if we are to compete with other countries.
  7. If people behave in ways that they believe are in their best self-interest, how would you explain the following?
    - a. Mother Teresa devoted her entire life to living in the worst slums of Asia, providing aid to others.
    - b. Bernie Madoff created a scheme whereby people gave him billions of dollars to invest that he simply kept for himself.
    - c. Pat Tillman gave up millions of dollars when he chose to enlist in the military following the 9/11 attack on the United States rather than play professional football.
  8. Use economics to explain why men's and women's restrooms tend to be located near each other in airports and other public buildings.
  9. Use the Broken Window Fallacy to explain what the "seen" and "unseen" effects of the government's decision to subsidize "green jobs" might be.
  10. Use economics to explain why people leave tips (a) at a restaurant they visit often and (b) at a restaurant they visit only once.
  11. Use economics to explain why people contribute to charities.
  12. Use economics to explain this statement: "Increasing the speed limit has, to some degree, compromised highway safety on interstate roads but enhanced safety on non-interstate roads."
  13. Apply the Broken Window Fallacy to the argument that an earthquake in Haiti is beneficial in the sense that reconstruction will create jobs and income.
- You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



# WOMEN STILL LAG BEHIND MEN IN PAY

*Northeast Mississippi Daily Journal (Tupelo) May 15, 2011*

**I** usually don't get riled up when it comes to so-called feminist causes. But when it comes to equal pay for men and women, I do.

The country "celebrated" Equal Pay Day on April 12. The day symbolizes how far into 2011 women had to work to earn what men did in 2010. That's nearly 3 and a half additional months.

In Mississippi, on average, a woman working full time is paid \$28,506 per year, while a man working full time is paid \$37,528 annually, according to research from the National Partnership for Women & Families. That's a gap of \$9,022. Nationally, full-time working women are paid \$10,622 less than men.

If the wage gap were eliminated, Mississippi's working women would have enough money for any of the following:

- 79 more weeks of food.
- Nine more months of mortgage and utilities payments.
- 14 more months of rent.
- Two more years of family health insurance premiums.
- More than 2,000 gallons of gas.

Because of the gender gap, women need to work more than 11 extra years to earn as much as men before retirement, according to *The Washington Post*.

Today, women are paid about 77 cents for every \$1 a man earns. The pay drops for black women to 61 cents and Latinas to 52 cents. On top of that, women with children are paid 2.5 percent less than women without children. Yet, men with children get paid 2.1 percent more than men without children, according to a Government Accountability Office study. Unless things change, women won't come close to being paid the same amount as men until 2058—when today's high school students are preparing for retirement.

People argue that men get paid more because they enter into higher-paying jobs. The facts don't support that point of view. The National Association of Colleges and Employees last week released data showing that female graduates from the Class of 2010 are making 17 percent less than their male counterparts. Even when salary is adjusted by major, men

come out ahead in most cases. A noticeable exception was engineering, where women made more because they are rare and command a premium.

But NACE said being a rarity isn't a guarantee of a higher salary. Women earning degrees in computer science are also scarce—representing about 18 percent of degrees—but averaged \$52,531 in starting salary, while men earned \$56,227. And in education—a field that is dominated by women—NACE data also showed that the female grads are getting cheated.

Women account for nearly 80 percent of education graduates, but their starting salary averaged \$29,092. The men? \$39,849.

So employers, as you get ready to hire a new crop of college graduates, do your part to help close the gender gap. We women work our tails off and we deserve to get paid the same amount as the men do.

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**Source:** Carlie Kollath, *Northeast Mississippi Daily Journal*, Tupelo, May 15, 2011 Sunday.

**A**ccording to the article, the pay gap between men and women is very large and narrowing very slowly. How could choice and costs and benefits explain such a gap? Economics is the study of human behavior, so it ought to be able to explain why people would choose one occupation over another or choose one college major over another. Do women choose occupations that pay less than occupations men choose because women want to have families or to enjoy other aspects of life, whereas men devote themselves to work, define themselves in terms of their work? If so, this could explain the differential in pay.

Economists argue that decisions are the result of comparing costs and benefits. In this article, two major decisions are not discussed but are implied: going to college and selecting a major. The first decision compares the future income and quality of living that a college degree will offer with the costs of obtaining that college degree. What you major in determines your value to a firm or the skills you have to pursue graduate study or other careers. What is the cost of the degree? It is the expense of college—what many students take out loans to pay. It is also the forgone income—that is, the income that you would have earned had you not gone to college. Someone who takes four or five years to complete college has paid tuition, purchased books and materials, and paid for room and board over those years. Those costs range from a bare minimum of \$20,000 to well over \$100,000. You may have worked part time while you were attending college, but if you had not been attending college, you could have worked full time. The difference for the years of college would have been about \$50,000. Thus, the cost of college could have been \$150,000 or more. But the cost of a major also includes the opportunity costs of the time devoted to completing the program. It is more costly to get an engineering degree than an education degree because the engineering program is difficult: The time commitment above and beyond the education major is significant. Women who major in education make 60 percent of what female engineers make in

their first year of work. But far more women still choose education over engineering. Why would they do this? For some, the idea that at some stage in their career, they will choose to leave the labor force and have children means they will want a career that enables them to leave and perhaps return later, when the children are in school. A highly scientific field where knowledge changes rapidly would be a poor choice since leaving for a few years would mean it is virtually impossible to come back into the profession; the knowledge one had at the time of leaving the workforce would be obsolete within a few years. Selecting education makes a lot of sense for the women expecting to have and raise a family. They can return to education without having lost knowledge. They can work the same hours as their children are in school, thus being able to take care of young children.

Selecting a major involves a comparison of costs and benefits. Different majors mean different amounts of future income. If the choice of major were only a matter of comparisons of future income, there would be fewer art history majors and elementary-school teachers but more engineers and medical doctors. But income is not the only thing that enters into one's benefit calculations. Interest in the subject, living styles, amount of leisure time, and other aspects of life enter into one's choice of a college major. Every college student tends to select the major that fits with the life style they hope to have—the major that yields the greatest net benefits to each individual.

If salary differentials between men and women are due to choice of college major and occupation, why then would one say "Even when salary is adjusted by major, men come out ahead in most cases"? Moreover, why would women make more in engineering and less in computer science than men? Both are scientific fields, and in both fields women constitute only about 18 percent of the profession. Does knowledge change more rapidly in computer science than in engineering? If so, could that explain the difference between the pay gap between men and women in the two fields? Using the principles of economics, see if you can come up with a possible explanation.



## Working with Graphs

According to the old saying, one picture is worth a thousand words. If that maxim is correct, and, in addition, if producing a thousand words takes more time and effort than producing one picture, it is no wonder that economists rely so extensively on pictures. The pictures that economists use to explain concepts are called *graphs*. The purpose of this appendix is to explain how graphs are constructed and how to interpret them.

### 1. Reading Graphs

The three kinds of graphs used by economists are shown in Figures 1, 2, and 3. Figure 1 is a *line graph*. It is the most commonly used type of graph in economics. Figure 2 is a *bar graph*. It is probably used more often in popular magazines than any other kind of graph. Figure 3 is a *pie graph* or *pie chart*. Although it is less popular than bar and line graphs, the pie graph appears often enough that you need to be familiar with it.

#### 1.a. Relationships between Variables

Figure 1 is a line graph showing the ratio of the median income of people who have completed four or more years of college to the median income of those who have completed just four years of high school. The line shows the value of a college education in terms of the additional income earned relative to the income earned without a college degree on a year-to-year basis. You can see that the premium for completing college rose from the mid-1970s until 2001 and has declined slightly since.

Figure 2 is a bar graph indicating the unemployment rate by educational attainment. The blue refers to high school dropouts, the red refers to those with four years of high school, and the green refers to those with four or more years of college. One set of bars is presented for males and one set for females. The bars are arranged in order, with the highest incidence of unemployment depicted first, the next highest second, and the lowest third. This arrangement is made only for ease in reading and interpretation. The bars could be arranged in any order. The graph illustrates that unemployment strikes those with less education more than it does those with more education.

Figure 3 is a pie chart showing the percentage of the U.S. population completing various numbers of years of schooling. Unlike line and bar graphs, a pie chart is not actually a picture of a relationship between two variables. Instead, the pie represents the whole, 100 percent of the U.S. population, and the pieces of the pie represent parts of the whole—the percentage of the population completing one to four years of elementary school only, five to seven years of elementary school, and so on, up to four or more years of college.

Because a pie chart does not show the relationship between variables, it is not as useful for explaining economic concepts as line and bar graphs. Line graphs are used more often than bar graphs to explain economic concepts.

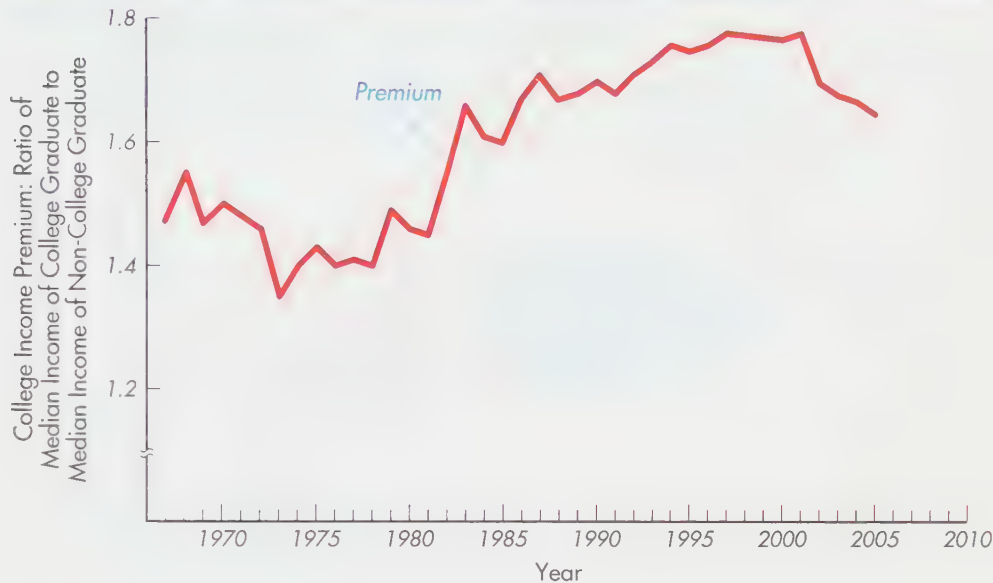
**FIGURE 1** Ratio of Median Incomes of College-to-High School-Educated Workers

Figure 1 is a line graph showing the ratio of the median income of people who have completed four or more years of college to the median income of those who have completed four years of high school. The line shows the income premium for educational attainment, or the value of a college education in terms of income, from year to year. The rise in the line since about 1979 shows that the premium for completing college has risen.

Source: U.S. Statistical Abstract, 2005. U.S. Census Bureau; [www.census.gov](http://www.census.gov).

**FIGURE 2** Unemployment and Education

Figure 2 is a bar graph indicating the unemployment rate by educational attainment. The blue refers to high school dropouts, the red refers to those with four years of high school, and the green refers to those with four or more years of college. One set of bars is presented for males and one set for females. The bars are arranged in order, with the highest incidence of unemployment shown first, the next highest second, and the lowest third. This arrangement is made only for ease in reading and interpretation. The bars could be arranged in any order.

Source: U.S. Census Bureau; [www.census.gov/population](http://www.census.gov/population).



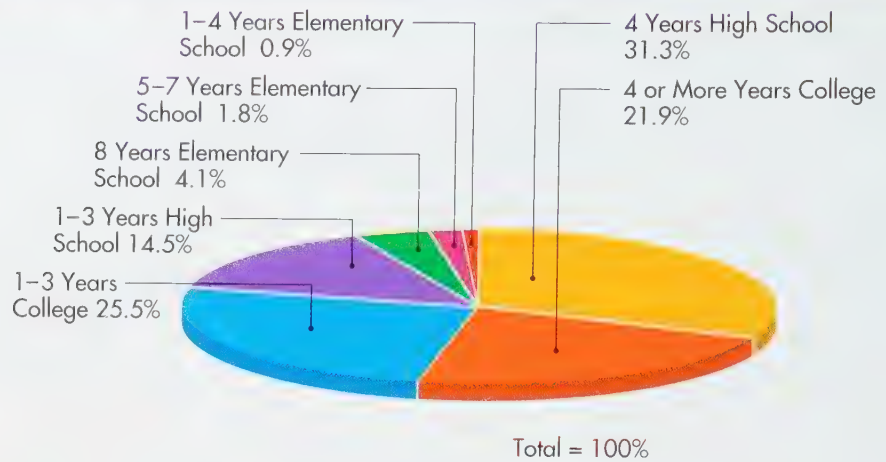
**FIGURE 3** Educational Attainment

Figure 3 is a pie chart showing the percentage of the U.S. population completing various years of schooling. Unlike line and bar graphs, a pie chart is not actually a picture of a relationship between two variables. Instead, the pie represents the whole, 100 percent of the U.S. population in this case, and the pieces of the pie represent parts of the whole—the percentage of the population completing one to four years of elementary school only, five to seven years of elementary school, and so on, up to four or more years of college.

Source: U.S. Census Bureau, 2009; [www.census.gov/population](http://www.census.gov/population).

### independent variable

A variable whose value does not depend on the values of other variables.

### dependent variable

A variable whose value depends on the value of the independent variable.

### direct, or positive, relationship

The relationship that exists when the values of related variables move in the same direction.

### inverse, or negative, relationship

The relationship that exists when the values of related variables move in opposite directions.

## 1.b. Independent and Dependent Variables

Most line and bar graphs involve just two variables, an **independent variable** and a **dependent variable**. An independent variable is one whose value does not depend on the values of other variables; a dependent variable, on the other hand, is one whose value does depend on the values of other variables. The value of the dependent variable is determined after the value of the independent variable is determined.

In Figure 2, the *independent* variable is the educational status of the man or woman, and the *dependent* variable is the incidence of unemployment (the percentage of the group that is unemployed). The incidence of unemployment depends on the educational attainment of the man or woman.

## 1.c. Direct and Inverse Relationships

If the value of the dependent variable increases as the value of the independent variable increases, the relationship between the two types of variables is called a **direct, or positive, relationship**. If the value of the dependent variable decreases as the value of the independent variable increases, the relationship between the two types of variables is called an **inverse, or negative, relationship**.

In Figure 2, unemployment and educational attainment are inversely, or negatively, related: As people acquire more education, they become less likely to be unemployed.

## 2. Constructing a Graph

Let's now construct a graph. We will begin with a consideration of the horizontal and vertical axes, or lines, and then we will put the axes together. We are going to construct a *straight-line curve*. This sounds contradictory, but it is common terminology. Economists often refer to the demand or supply *curve*, and that curve may be a straight line.

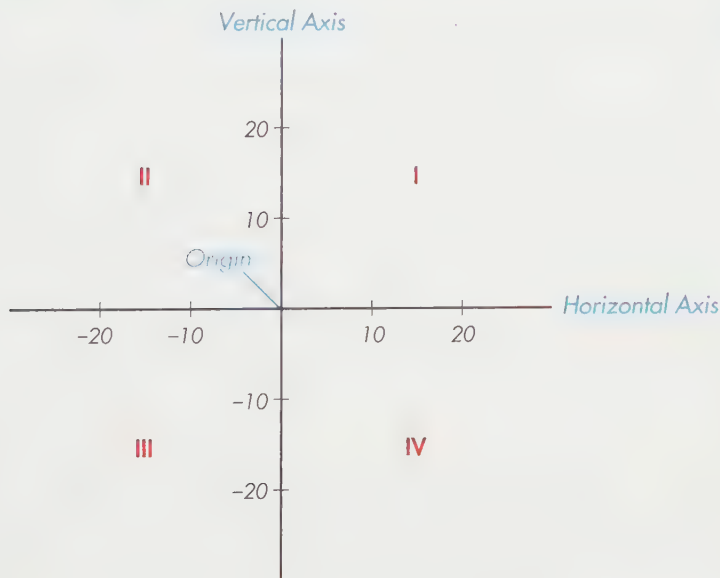
### 2.a. The Axes

It is important to understand how the *axes* (the horizontal and vertical lines) are used and what they measure. Let's begin with the horizontal axis, the line running across the page. Notice in Figure 4(a) that the line is divided into equal segments. Each point on the line represents a quantity, or the value of the variable being measured. For example, each segment could represent one year or 10,000 pounds of diamonds or some other value. Whatever is measured, the value increases from left to right, beginning with negative values, going on to zero, which is called the *origin*, and then moving on to positive numbers.

A number line in the vertical direction can be constructed as well, and this is also shown in Figure 4(a). Zero is the origin, and the numbers increase from bottom to top. Like the horizontal axis, the vertical axis is divided into equal segments; the distance between 0 and 10 is the same as the distance between 0 and -10, the distance between 10 and 20, and so on.

**FIGURE 4** The Axes, the Coordinate System, and the Positive Quadrant

(a) The Coordinate System



(b) The Positive Quadrant

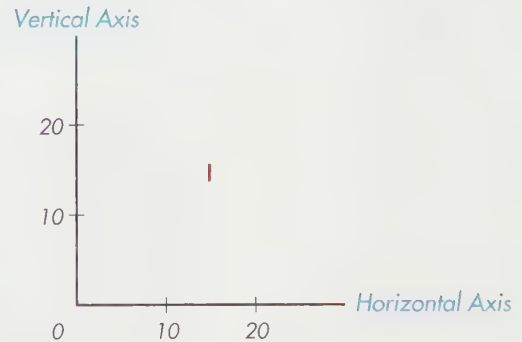


Figure 4(a) shows the vertical and horizontal axes. The horizontal axis has an origin, measured as zero, in the middle. Negative numbers are to the left of zero, and positive numbers are to the right. The vertical axis also has an origin in the middle. Positive numbers are above the origin, and negative numbers are below. The horizontal and vertical axes together show the entire coordinate system. Positive numbers are in quadrant I, negative numbers in quadrant III, and combinations of negative and positive numbers in quadrants II and IV. Figure 4(b) shows only the positive quadrant. Because most economic data are positive, often only the upper right quadrant, the positive quadrant, of the coordinate system is used.



In most cases, the variable measured along the horizontal axis is the independent variable. This isn't always true in economics, however. Economists often measure the independent variable on the vertical axis. Do not assume that the variable on the horizontal axis is independent and the variable on the vertical axis is dependent.

Putting the horizontal and vertical lines together lets us express relationships between two variables graphically. The axes cross, or intersect, at their origins, as shown in Figure 4(a). From the common origin, movements to the right and up, in the area—called a quadrant—marked I, are combinations of positive numbers; movements to the left and down, in quadrant III, are combinations of negative numbers; movements to the right and down, in quadrant IV, are negative values on the vertical axis and positive values on the horizontal axis; and movements to the left and up, in quadrant II, are positive values on the vertical axis and negative values on the horizontal axis.

Economic data are typically positive numbers: the unemployment rate, the inflation rate, the price of something, the quantity of something produced or sold, and so on. Because economic data are usually positive numbers, the only part of the coordinate system that usually comes into play in economics is the upper right portion, quadrant I. That is why economists may simply sketch a vertical line down to the origin and then extend a horizontal line out to the right, as shown in Figure 4(b). Once in a while, economic data are negative—for instance, profit is negative when costs exceed revenues. When data are negative, quadrants II, III, and IV of the coordinate system may be used.

## 2.b. Constructing a Graph from a Table

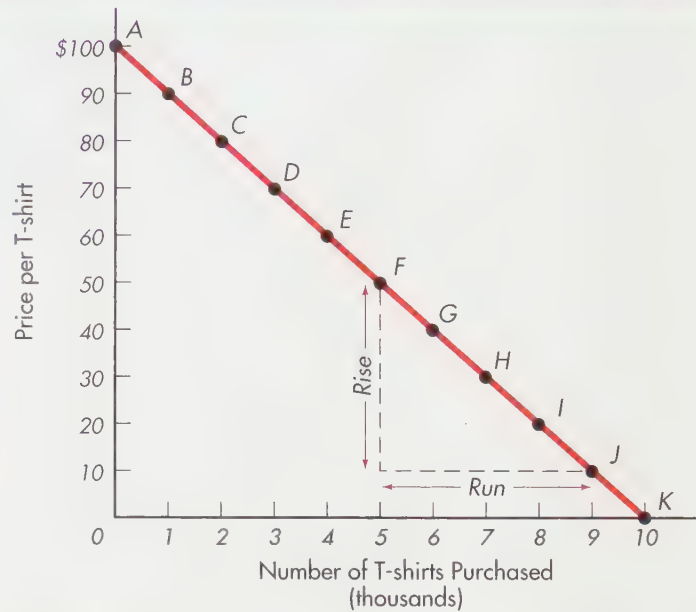
Now that you are familiar with the axes—that is, the coordinate system—you are ready to construct a graph using the data in the table in Figure 5. The table lists a series of possible price levels for a T-shirt and the corresponding number of T-shirts that people choose to purchase. The data are only hypothetical; they are not drawn from actual cases.

The information given in the table is graphed in Figure 5. We begin by marking off and labeling the axes. The vertical axis is the list of possible price levels. We begin at zero and move up the axis in equal increments of \$10. The horizontal axis is the number of T-shirts sold. We begin at zero and move along the axis in equal increments of 1,000 T-shirts. According to the information presented in the table, if the price is higher than \$100, no one buys a T-shirt. The combination of \$100 and 0 T-shirts is point *A* on the graph. To plot this point, find the quantity zero on the horizontal axis (it is at the origin), and then move up the vertical axis from zero to a price level of \$100. (Note that we have measured the units in the table and on the graph in thousands.) At a price of \$90, there are 1,000 T-shirts purchased. To plot the combination of \$90 and 1,000 T-shirts, find 1,000 units on the horizontal axis and then measure up from there to a price of \$90. This is point *B*. Point *C* represents a price of \$80 and 2,000 T-shirts. Point *D* represents a price of \$70 and 3,000 T-shirts. Each combination of price and T-shirts purchased listed in the table is plotted in Figure 5.

The final step in constructing a line graph is to connect the points that are plotted. When the points are connected, the straight line slanting downward from left to right in Figure 5 is obtained. It shows the relationship between the price of T-shirts and the number of T-shirts purchased.

**FIGURE 5** Constructing a Line Graph

| Point | Price per T-shirt | Number of T-shirts |
|-------|-------------------|--------------------|
| A     | \$100             | 0                  |
| B     | 90                | 1,000              |
| C     | 80                | 2,000              |
| D     | 70                | 3,000              |
| E     | 60                | 4,000              |
| F     | 50                | 5,000              |
| G     | 40                | 6,000              |
| H     | 30                | 7,000              |
| I     | 20                | 8,000              |
| J     | 10                | 9,000              |
| K     | 0                 | 10,000             |



The information given in the table is plotted or graphed. The vertical axis measures price per T-shirt. The horizontal axis measures the number of T-shirts in thousands. We begin at zero in each case and then go up (if the vertical axis) or out (if the horizontal axis) in equal amounts. The vertical axis goes from \$0 to \$10 to \$20 and so on, while the horizontal axis goes from 0 to 1,000 to 2,000 and so on. Each point is plotted. For instance, point A is a price of \$100 and a number of T-shirts of 0. This is found by going to 0 on the horizontal axis and then up to \$100 on the vertical axis. Point B is a price of \$90 and a number of 1,000. Once the points are plotted, a line connecting the points is drawn.

## 2.c. Interpreting Points on a Graph

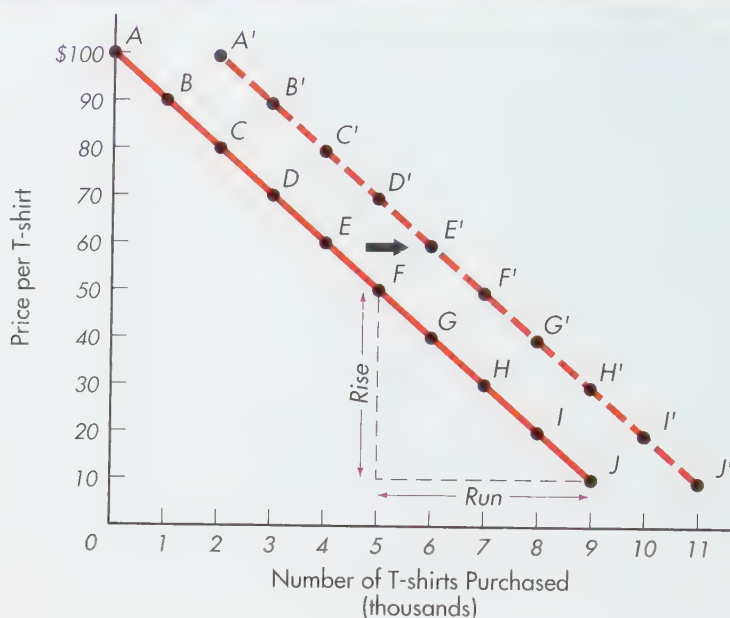
Let's use Figure 5 to demonstrate how points on a graph may be interpreted. Suppose the current price of a T-shirt is \$30. Are you able to tell how many T-shirts are being purchased at this price? By tracing that price level from the vertical axis over to the curve and then down to the horizontal axis, you find that 7,000 T-shirts are being purchased. You can also find what happens to the number purchased if the price falls from \$30 to \$10. By tracing from the price of \$10 horizontally to the curve and then down to the horizontal axis, you discover that 9,000 T-shirts are purchased. Thus, according to the graph, a decrease in the price from \$30 to \$10 results in 2,000 more T-shirts being purchased.

## 2.d. Shifts of Curves

Graphs can be used to illustrate the effects of a change in a variable that is not represented on the graph. For instance, the curve drawn in Figure 5 shows the relationship between the price of T-shirts and the number of T-shirts purchased. When this curve was drawn, the only two variables that were allowed to change were the price and the number of T-shirts. However, it is likely that people's incomes determine their reaction to the price of T-shirts as well. An increase in income would enable people to purchase more T-shirts. Thus, at every price, more T-shirts would be purchased. How would this be represented? As an outward shift of the curve, from points A, B, C, and so on to A', B', C', and so on, as shown in Figure 6.

Following the shift of the curve, we can see that more T-shirts are purchased at each price than was the case prior to the income increase. For instance, at a price of \$20, the



**FIGURE 6** Shift of Curve

An increase in income allows more people to purchase T-shirts at each price. At a price of \$80, for instance, 4,000 T-shirts are purchased instead of 2,000.

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increased income allows 10,000 T-shirts to be purchased rather than 8,000. The important point to note is that if some variable that influences the relationship shown in a curve or line graph changes, then *the entire curve or line changes—that is, it shifts*.

### 3. Slope

A curve may represent an inverse, or negative, relationship or a direct, or positive, relationship. The slope of the curve reveals the kind of relationship that exists between two variables.

#### 3.a. Positive and Negative Slopes

The **slope** of a curve is its steepness, the rate at which the value of a variable measured on the vertical axis changes with respect to a given change in the value of the variable measured on the horizontal axis. If the value of a variable measured on one axis goes up when the value of the variable measured on the other axis goes down, the variables have an inverse (or negative) relationship. If the values of the variables rise or fall together, the variables have a direct (or positive) relationship. Inverse relationships are represented by curves that run downward from left to right; direct relationships are represented by curves that run upward from left to right.

Slope is calculated by measuring the amount by which the variable on the vertical axis changes and dividing that figure by the amount by which the variable on the horizontal axis changes. The vertical change is called the *rise*, and the horizontal change is called the *run*. Slope is referred to as the *rise over the run*:

$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

#### slope

The steepness of a curve, measured as the ratio of the rise to the run.

The slope of any inverse relationship is negative. The slope of any direct relationship is positive.

Let's calculate the slope of the curve in Figure 5. Price ( $P$ ) is measured on the vertical axis, and the quantity of T-shirts purchased ( $Q$ ) is measured on the horizontal axis. The rise is the change in price ( $\Delta P$ ), the change in the value of the variable measured on the vertical axis. The run is the change in the quantity of T-shirts purchased ( $\Delta Q$ ), the change in the value of the variable measured on the horizontal axis. (The symbol  $\Delta$  means "change in"—it is the Greek letter delta—so  $\Delta P$  means "change in  $P$ " and  $\Delta Q$  means "change in  $Q$ ".) Remember that slope equals the rise over the run. Thus, the equation for the slope of the straight-line curve running downward from left to right in Figure 5 is

$$\frac{\Delta P}{\Delta Q}$$

As the price ( $P$ ) declines, the number of T-shirts purchased ( $Q$ ) increases. The rise is negative, and the run is positive. Thus, the slope is a negative value. The slope is the same anywhere along a straight line. Thus, it does not matter where we calculate the changes along the vertical and horizontal axes. For instance, from 0 to 10,000 on the horizontal axis—a run of 10,000—the vertical change, the rise, is a negative \$100 (from \$100 down to \$0). Thus, the rise over the run is  $-100/10,000$ , or  $-.01$ . Similarly, from 5,000 to 9,000 in the horizontal direction, the corresponding rise is \$50 to \$10, so that the rise over the run is  $-40/4,000$  or  $-.01$ .

Remember that direct, or positive, relationships between variables are represented by lines that run upward from left to right. Figure 7 is a graph showing the number of

**FIGURE 7** T-Shirts Offered for Sale at Each Price

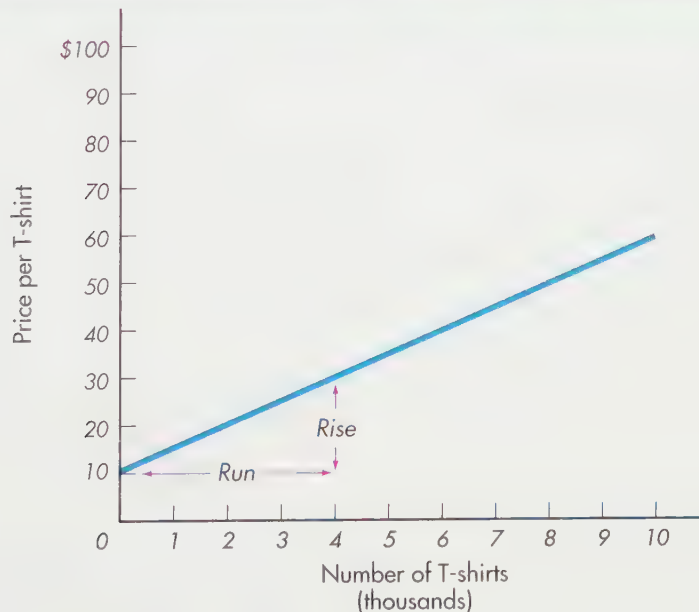


Figure 7 is a graph showing the number of T-shirts offered for sale at various prices. The line shows that as price rises so does the number of T-shirts offered for sale. At a price of \$10, no shirts are offered. At a price of \$20, 2,000 shirts are offered for sale. At a price of \$30, 4,000 shirts are offered for sale, and so on. The rise over the run is  $20/4,000 = .005$ .



T-shirts that producers offer for sale at various price levels. The curve represents the relationship between the two variables, the number of T-shirts offered for sale and price. It shows that as price rises, so does the number of T-shirts offered for sale. The slope of the curve is positive. The change in the rise (the vertical direction) that comes with an increase in the run (the horizontal direction) is positive. Because the graph is a straight line, you can measure the rise and run using any two points along the curve and the slope will be the same. We find the slope by calculating the rise that accompanies the run. Moving from 0 to 4,000 T-shirts gives us a run of 4,000. Looking at the curve, we see that the corresponding rise is \$20. Thus, the rise over the run is  $20/4,000$ , or .005.

## SUMMARY

- There are three commonly used types of graphs: the line graph, the bar graph, and the pie chart. §1.a
- An independent variable is a variable whose value does not depend on the values of other variables. The values of a dependent variable do depend on the values of other variables. §1.b
- A direct, or positive, relationship occurs when the value of the dependent variable increases as the value of the independent variable increases. An indirect, or negative, relationship occurs when the value of the dependent variable decreases as the value of the independent variable increases. §1.c
- Most economic data are positive numbers, and so only the upper right quadrant of the coordinate system is often used in economics. §2.a
- A curve shifts when a variable that affects the dependent variable and is not measured on the axes changes. §2.d
- The slope of a curve is the rise over the run: the change in the variable measured on the vertical axis over the corresponding change in the variable measured on the horizontal axis. §3.a
- The slope of a straight-line curve is the same at all points along the curve. §3.a

## KEY TERMS

independent variable, 14  
dependent variable, 14

direct, or positive, relationship, 14  
inverse, or negative, relationship, 14

slope, 18

## EXERCISES

1. Listed in the following table are two sets of figures: the total quantity of Mexican pesos (new pesos) in circulation (the total amount of Mexican money available) and the peso price of a U.S. dollar (how many pesos are needed to purchase one U.S. dollar). Values are given for the years 1990–2009 for each variable.
  - a. Plot each variable by measuring time (years) on the horizontal axis and, in the first graph, pesos in circulation on the vertical axis and, in the second graph, peso price of a dollar on the vertical axis.
  - b. Plot the combinations of variables by measuring pesos in circulation on the horizontal axis and peso prices of a dollar on the vertical axis.

- c. In each of the graphs in parts a and b, what are the dependent and independent variables?
- d. In each of the graphs in parts a and b, indicate whether the relationship between the dependent and independent variables is direct or inverse.

2. Plot the data listed in the table below.
  - a. Use price as the vertical axis and quantity as the horizontal axis and plot the first two columns.
  - b. Show what quantity is sold when the price is \$550.
  - c. Directly below the graph in part a, plot the data in columns 2 and 3. Use total revenue as the vertical axis and quantity as the horizontal axis.
  - d. What is total revenue when the price is \$550? Will total revenue increase or decrease when the price is lowered?

| Year | Pesos in Circulation<br>(billions) | Peso Price of a<br>U.S. Dollar |
|------|------------------------------------|--------------------------------|
| 1990 | 19.6                               | 2.8126                         |
| 1991 | 27.0                               | 3.0184                         |
| 1992 | 36.2                               | 3.0949                         |
| 1993 | 42.0                               | 3.1156                         |
| 1994 | 47.2                               | 3.3751                         |
| 1995 | 56.9                               | 6.4194                         |
| 1996 | 66.8                               | 7.5994                         |
| 1997 | 84.0                               | 8.5850                         |
| 1998 | 109.0                              | 9.9680                         |
| 1999 | 131.0                              | 9.4270                         |
| 2000 | 188.8                              | 9.6420                         |
| 2001 | 209.0                              | 9.2850                         |
| 2002 | 225.0                              | 9.5270                         |
| 2003 | 264.0                              | 10.9000                        |
| 2004 | 303.0                              | 11.4000                        |
| 2005 | 340.0                              | 10.4750                        |
| 2006 | 380.0                              | 10.87                          |
| 2007 | 450.0                              | 10.86                          |
| 2008 | 495.0                              | 13.53                          |
| 2009 | 578.0                              | 13.76                          |

| Price   | Quantity Sold | Total Revenue |
|---------|---------------|---------------|
| \$1,000 | 200           | 200,000       |
| 900     | 400           | 360,000       |
| 800     | 600           | 480,000       |
| 700     | 800           | 560,000       |
| 600     | 1,000         | 600,000       |
| 500     | 1,200         | 600,000       |
| 400     | 1,400         | 560,000       |
| 300     | 1,600         | 480,000       |
| 200     | 1,800         | 360,000       |
| 100     | 2,000         | 200,000       |



## CHAPTER 2

# Choice, Opportunity Costs, and Specialization

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### FUNDAMENTAL QUESTIONS

- 1 What are opportunity costs? Are they part of the economic way of thinking?
- 2 What is a production possibilities curve?
- 3 Why does specialization occur?
- 4 What are the benefits of trade?



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In the previous chapter, we learned that scarcity forces people to make choices. A choice means that you select one thing instead of selecting others. What you don't select is the cost of the choice you make. The old saying that "there is no free lunch" means that every choice requires that something be given up or sacrificed. In this chapter, we discuss how costs affect the behavior of individuals, firms, and societies as a whole.

# 1. Opportunity Costs

A choice is simply a comparison of alternatives: to attend class or not to attend class, to purchase a double latte mocha with whipped cream or to buy songs from iTunes, to purchase a new car or to keep the old one. When one option is chosen, the benefits of the alternatives are forgone. When you choose to purchase the double latte mocha for \$4, you don't have that \$4 to spend on anything else. *Economists refer to the forgone opportunities or forgone benefits of the next best alternative as opportunity costs.* Opportunity costs are the highest-valued alternative that must be forgone when a choice is made. If you bought four iTunes items instead of buying the latte, then we say the opportunity cost of the latte is the benefit you don't enjoy from the iTunes purchases.

The concept of cost is often more than the dollars and cents you shell out at the cash register. Buying used books saves money but often increases frustration and may affect your grades. The book might be missing pages, unreadable in spots, or out of date. The full cost of the book is the price you paid for the used copy plus the frustration of having an incomplete book. An attorney in Scottsdale, Arizona, is paid \$325 an hour to write contracts. The attorney loves Ralph Lauren dress shirts and can get them for \$100 at Nordstrom in Scottsdale or, when they are available, for \$50 at the outlet mall in Casa Grande. He likes to purchase just one or two shirts at a time and usually buys them at Nordstrom, taking 15 minutes out of his lunch time to go to the store. Is this smart? Well, he figures he could spend two hours driving to Casa Grande and back and save \$50 per shirt. But this also means he is not writing contracts and charging \$325 per hour during those two hours. The real cost of the \$50 saved on a single shirt in Casa Grande is the amount that the attorney would give up in income, \$325 per hour less the \$50 savings on each shirt, plus the cost of the additional gas used.

When economists refer to costs, it is opportunity costs they are measuring. The cost of anything is what must be given up to get that item. Every human activity responds to costs in one way or another. When the cost of something falls, that something becomes more attractive to us, all else being the same. For instance, when the cost of text messaging phone service dropped, more of us signed up for the service. Conversely, when the cost of something rises, and all else remains unchanged, we tend to use less of it. When photo radar machines were placed on the freeways in Arizona, the cost of speeding went up because the likelihood of getting caught speeding dramatically increased. As a result, the amount of speeding dropped—average speeds went from 78 to 65 virtually overnight.

## 1.a. Trade-offs

Life is a continuous sequence of decisions, and every single decision involves choosing one thing over another or trading off something for something else. A **trade-off** means a sacrifice—giving up one good or activity in order to obtain some other good or activity. Each term you must decide whether or not to register for college. You could work full time and not attend college, attend college and not work, or work part time and attend college. The time you devote to college will decrease as you devote more time to work. You trade off hours spent at work for hours spent in college; in other words, you compare the benefits you think you will get from going to college this term with the costs of college this term.

## 1.b. The Production Possibilities Curve

Trade-offs can be illustrated in a graph known as the **production possibilities curve (PPC)**. The production possibilities curve shows all possible combinations of quantities of goods and services that can be produced when the existing resources are used *fully and efficiently*. Figure 1 shows a production possibilities curve (based on information in the table in Figure 1) for the production of defense goods and services and nondefense



- 1 What are opportunity costs? Are they part of the economic way of thinking?

### opportunity cost

The highest-valued alternative that must be forgone when a choice is made.



- 2 What is a production possibilities curve?

### production possibilities curve (PPC)

A graphical representation showing all possible combinations of quantities of goods and services that can be produced using the existing resources fully and efficiently.



## ECONOMIC INSIGHT



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### A Tricky Question on Opportunity Costs

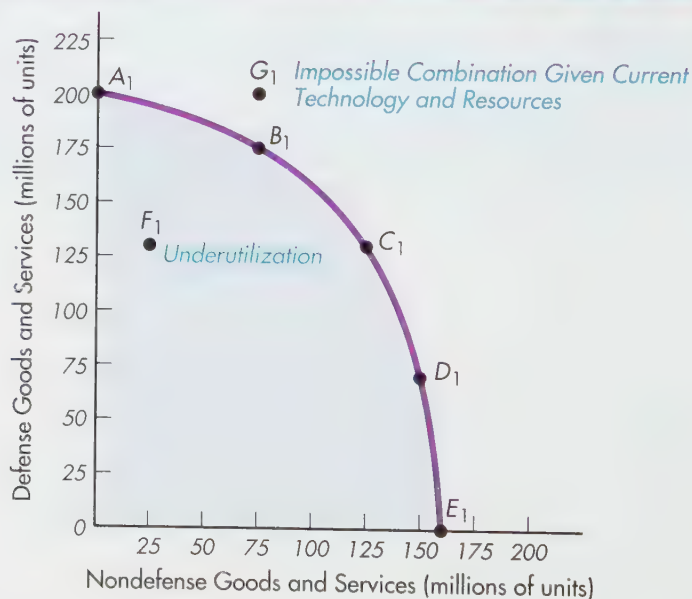
A few years ago, a problem similar to the following was given to economists at their annual convention. Only a small percentage came up with the right answer.

You have won a free ticket for a concert by a popular performer we will call A (the ticket has no resale value). Another performer you also like, B, is putting on a concert at the same time and that is your next-best alternative activity (and vice versa). A ticket for B's concert is \$40. On any given day, you would be willing to pay up to \$50 for B's ticket. You decide to attend A's concert. Based on this information, what is your opportunity cost of going to A's concert?

- a) \$40
- b) \$50
- c) \$0
- d) \$10
- e) \$60

You chose to go to the free concert, so you value that ticket at least equal to how much you value a ticket to B's concert. You would have been willing to pay \$50 for B's concert but would have had to pay \$40, so the net benefit you would have received is \$10. It is this you give up to attend A's concert.

**FIGURE 1** The Production Possibilities Curve



With a limited amount of resources, only certain combinations of defense and nondefense goods and services can be produced. The maximum amounts that can be produced, given various tradeoffs, are represented by points A<sub>1</sub> through E<sub>1</sub>. Point F<sub>1</sub> lies inside the curve and represents the underutilization of resources. More of one type of goods could be produced without producing less of the other, or more of both types could be produced. Point G<sub>1</sub> represents an impossible combination. There are insufficient resources to produce quantities lying beyond the curve.

goods and services by a nation. Defense goods and services include guns, ships, bombs, personnel, and so forth that are used for national defense. Nondefense goods and services include education, housing, health care, and food that are not used for national defense. All societies allocate their scarce resources in order to produce some combination of defense and nondefense goods and services. Because resources are scarce, a nation cannot produce as much of everything as it wants. When it produces more health care, it cannot produce as much education or automobiles; when it devotes more of its resources to the military area, fewer resources are available to devote to health care.

In Figure 1, units of defense goods and services are measured on the vertical axis, and units of nondefense goods and services are measured on the horizontal axis. If all resources are allocated to producing defense goods and services, then 200 million units can be produced, but there will be no production of nondefense goods and services. The combination of 200 million units of defense goods and services and 0 units of nondefense goods and services is point  $A_1$ , a point on the vertical axis. At 175 million units of defense goods and services, 75 million units of nondefense goods and services can be produced (point  $B_1$ ). Point  $C_1$  represents 125 million units of nondefense goods and services and 130 million units of defense goods. Point  $D_1$  represents 150 million units of nondefense goods and services and 70 million units of defense goods and services. Point  $E_1$ , a point on the horizontal axis, shows the combination of no production of defense goods and services and 160 million units of nondefense goods and services.

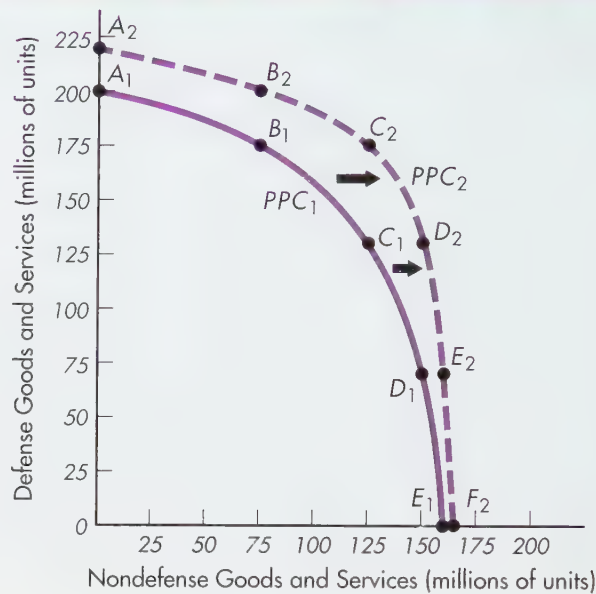
**1.b.1. Points Inside the Production Possibilities Curve** Suppose a nation produces 130 million units of defense goods and services and 25 million units of nondefense goods and services. That combination, Point  $F_1$  in Figure 1, lies inside the production possibilities curve. A point lying inside the production possibilities curve indicates that resources are not being fully or efficiently used. If the existing workforce is employed only 20 hours per week, it is not being fully used. If two workers are used when one would be sufficient—say, two people in each Domino's Pizza delivery car—then resources are not being used efficiently. If there are resources available for use, society can move from point  $F_1$  to a point on the PPC, such as point  $C_1$ . The move would gain 100 million units of nondefense goods and services with no loss of defense goods and services.

During recessions, unemployment rises and other resources are not fully and efficiently used. A point inside a nation's PPC could represent recession. This would be represented as a point inside the PPC, such as  $F_1$ . Should the economy expand, and resources become more fully and efficiently used, this would be represented as a move out from a point such as  $F_1$  to a point on the PPC, such as point  $C_1$ .

**1.b.2. Points Outside the Production Possibilities Curve** Point  $G_1$  in Figure 1 represents the production of 200 million units of defense goods and services and 75 million units of nondefense goods and services. Point  $G_1$ , however, represents the use of more resources than are available—it lies outside the production possibilities curve. Unless more resources can be obtained and/or the quality of resources improved (for example, through technological change) so that the nation can produce more with the same quantity of resources, there is no way that the society can currently produce 200 million units of defense goods and 75 million units of nondefense goods.

**1.b.3. Shifts of the Production Possibilities Curve** If a nation obtains more resources or if the existing resources become more efficient, then the PPC shifts outward. Suppose a country discovers new sources of oil within its borders and is able to



**FIGURE 2** A Shift of the Production Possibilities Curve

Whenever everything else is not constant, the curve shifts. In this case, an increase in the quantity of a resource enables the society to produce more of both types of goods. The curve shifts out, away from the origin.

greatly increase its production of oil. Greater oil supplies would enable the country to increase production of all types of goods and services.

Figure 2 shows the production possibilities curve before ( $PPC_1$ ) and after ( $PPC_2$ ) the discovery of oil.  $PPC_1$  is based on the data given in Figure 1.  $PPC_2$  is based on the data given in Figure 2, which shows the increase in production of goods and services that result from the increase in oil supplies. The first combination of goods and services on  $PPC_2$ , point  $A_2$ , is 220 million units of defense goods and 0 units of nondefense goods. The second point,  $B_2$ , is a combination of 200 million units of defense goods and 75 million units of nondefense goods.  $C_2$  through  $F_2$  are the combinations shown in Figure 2. Connecting these points yields the bowed-out curve  $PPC_2$ . Because of the availability of new supplies of oil, the nation is able to increase production of all goods, as shown by the shift from  $PPC_1$  to  $PPC_2$ . A comparison of the two curves shows that more goods and services for both defense and nondefense are possible along  $PPC_2$  than along  $PPC_1$ .

The outward shift of the PPC can be the result of an increase in the quantity of resources, but it also can occur because the quality of resources improves. Economists call an increase in the quality of resources an increase in the productivity of resources. Consider a technological breakthrough that improves the speed with which data are transmitted. Following this breakthrough, it might require fewer people and machines to do the same amount of work, and it might take less time to produce the same quantity and quality of goods. Each quality improvement in resources is illustrated as an outward shift of the PPC.

## RECAP

1. Opportunity costs are the benefits that are forgone as a result of a choice. When you choose one thing, you must give up—forgo—others.
2. The production possibilities curve (PPC) illustrates the concept of opportunity cost. Each point on the PPC means that every other point is a forgone opportunity.
3. The PPC represents all combinations of goods and services that can be produced using limited resources efficiently to their full capabilities.
4. Points inside the PPC represent the underutilization, unemployment, or inefficient use of resources—more goods and services could be produced by using the limited resources more fully or efficiently.
5. Points outside the PPC represent combinations of goods and services that are unattainable given the limitation of resources.
6. If more resources are obtained or a technological change or innovation occurs, the PPC shifts out.

## 2. Specialization and Trade

The PPC illustrates the idea of scarcity—there are limits; combinations outside of the curve are not attainable with current resources and technology; choices have to be made—it is not possible to satisfy unlimited wants. The PPC also illustrates the idea of costs—no matter which combination of goods and services a society chooses to produce, other combinations of goods and services are sacrificed.



### 3 Why does specialization occur?

### 2.a. Marginal Cost

As the production of some types of goods is increased, some other types of goods and services cannot be produced. According to the graph in Figure 1, we see that moving from point  $A_1$  to point  $B_1$  on the PPC means increasing nondefense production from 0 to 75 million units and decreasing defense production from 200 million to 175 million units. Thus, the marginal cost of 75 million units of nondefense is 25 million units of defense. The incremental amount of defense given up with each increase in the production of nondefense goods is known as the **marginal cost** or **marginal opportunity cost**. *Marginal* means “change” or “incremental,” so marginal cost is the incremental amount of one good or service that must be given up to obtain one additional unit of another good or service.

Each move along the PPC means giving up some defense goods to get some more nondefense goods. Each additional nondefense good produced requires giving up an increasing number of defense goods. The marginal cost increases with each successive increase of nondefense production. In other words, all other things being equal, it gets more and more costly to produce nondefense goods the more nondefense goods you have.

Marginal cost increases because of specialization. The first resources transferred from defense to nondefense production are those that are least specialized in the production of defense goods. Switching these resources is less costly (less has to be given up) than switching the specialists. Shifting an accountant who can do accounting in either defense- or nondefense-related industries equally well would not cause a big change in defense production. However, shifting a rocket scientist, who is not very useful in producing nondefense goods, would make a big difference. Marginal is a very useful concept in economics. It means incremental or next unit or last unit. Economists often say economic thinking is marginal, by which they mean that it is the incremental or additional that determines behavior, not the total. When the next cookie is not as enjoyable to purchase and eat as is whatever else I might do with that money, I choose not to purchase the cookie.

#### **marginal cost** or **marginal opportunity cost**

The amount of one good or service that must be given up to obtain one additional unit of another good or service, no matter how many units are being produced.





4 What are the benefits of trade?

Individuals, firms, and nations select the option with the lowest opportunity costs.

gains from trade

The difference between what can be produced and consumed without specialization and trade and with specialization and trade.

comparative advantage

The ability to produce a good or service at a lower opportunity cost than someone else.

2.b. Specialize Where Opportunity Costs Are Lowest

If we have a choice, we should devote our time and efforts to those activities in which we are relatively better than others. In other words, we should specialize in those activities that require us to give up the smallest amount of other things relative to others. A plumber does plumbing and leaves teaching to the teachers. The teacher teaches and leaves electrical work to the electrician. A country such as Grenada specializes in spice production and leaves manufacturing to other countries.

**2.b.1. Trade** If we focus on one thing, how do we get the other things that we want? The answer is that we trade or exchange goods and services. The teacher teaches, earns a salary, and hires a plumber to fix the sinks. This is called voluntary trade or voluntary exchange. The teacher is trading money to the plumber for the plumber’s services. The teacher is trading her time to the students and getting money in return.

By specializing in the activities in which opportunity costs are lowest and then trading, everyone will end up with more than if everyone tried to produce everything. This is the **gains from trade**. Consider two students, Josh and Elena, who are sharing an apartment. Neither can cook, so they just order out a lot. But cleaning and laundry are other matters. Cleaning means vacuuming, dusting, mopping, and washing windows. A load of laundry consists of the wash, the drying, and the folding. If Josh and Elena both devote 10 hours to cleaning, each can clean 10 rooms. If they spend all their time and effort on laundry, Josh is able to complete 5 loads while Elena can do 10 loads.

|                        | Elena    |         | Josh     |         |
|------------------------|----------|---------|----------|---------|
|                        | Cleaning | Laundry | Cleaning | Laundry |
| All resources devoted: |          |         |          |         |
| To Cleaning            | 0        | 10      | 0        | 5       |
| To Laundry             | 10       | 0       | 10       | 0       |

Since Elena is better at cleaning and just as good at laundry, why should she want to work with Josh? The answer depends on relative costs. What does it cost Elena to do 1 load of laundry? She has to not clean 1 room. So, it costs her 1 room of cleaning to do 1 load of laundry. Josh can do 2 loads of laundry in the time he can clean just 1 room. So, it costs Josh just 1/2 of a clean room to do 1 load of laundry. Josh is *relatively* better at doing laundry—he can do it for lower costs than can Elena. He has a comparative advantage in laundry. **Comparative advantage** refers to a comparison of opportunity costs—do you have lower costs of carrying out some activity than someone else? If so, you have a comparative advantage.

Who is relatively better at cleaning? It costs Josh 2 loads of laundry to clean 1 room and it costs Elena 1 load of laundry to clean 1 room. So Elena is relatively more efficient at cleaning. She has a comparative advantage in cleaning.

If Elena specializes in cleaning and Josh in laundry, and then they trade, they will both be better off. To see this, let’s begin where there is no trade and Josh and Elena each spends half their time and effort on cleaning and half on laundry. By spending half her time on cleaning, Elena can clean 5 rooms, whereas Josh can only clean 2.5 by spending half his time on cleaning. They each can do 5 loads of laundry if they devote half their time to laundry.

|                        | Elena    |         | Josh     |         |
|------------------------|----------|---------|----------|---------|
|                        | Cleaning | Laundry | Cleaning | Laundry |
| All resources devoted: |          |         |          |         |
| To Cleaning            | 0        | 10      | 0        | 5       |
| To Laundry             | 10       | 0       | 10       | 0       |
| No Specialization      | 5        | 5       | 5        | 2.5     |

Now, let's assume that they specialize according to comparative advantage and then trade at a rate of 1 clean room for 1 completed load of laundry. Elena cleans 10 rooms. To get 5 loads of laundry, she needs to trade 5 cleaned rooms. She ends up the same as if she did not specialize. Josh, on the other hand, specializes by completing 10 loads of laundry. He can get 5 cleaned rooms for 5 loads of laundry, and he ends up 2.5 cleaned rooms better than if he had not traded.

|  | Elena    |         | Josh     |         |
|--|----------|---------|----------|---------|
|  | Cleaning | Laundry | Cleaning | Laundry |
| Specialization and trade at ratio of 2:1 | 5        | 5       | 5        | 5       |

Notice that there are gains from trade. There are 2.5 more clean rooms as a result of specialization and trade. In this case, the gains all went to Josh because the trading price, 1 to 1, was the same as Elena's personal opportunity cost ratio. Let's now change the trading price so that Elena gets the gains. Let's assume that they specialize and trade at a ratio of 2 loads of laundry for 1 clean room, Josh's personal opportunity cost ratio. In this case, Elena trades 2.5 cleaned rooms to get 5 loads of laundry. She is the one who gains this time:

|  | Elena    |         | Josh     |         |
|--|----------|---------|----------|---------|
|  | Cleaning | Laundry | Cleaning | Laundry |
| Specialization and trade at ratio of 2:1 | 5        | 7.5     | 5        | 2.5     |

In each of the two examples, just one party gained. This is because the trades took place first at Elena's opportunity cost ratio and then at Josh's opportunity cost ratio. In reality, people won't trade voluntarily unless they gain. Elena and Josh would work out how many cleaned rooms to trade for a load of laundry so that they both gained something.

Specialization and trade enable individuals, firms, and nations to acquire combinations of goods that lie beyond their own resource capabilities. Voluntary, free trade results in more being created—more income being generated, that is—and higher standards of living are being created because everything is produced at the lowest possible cost.

When you buy something, you are trading—you are exchanging money for some item. Similarly, when you sell something, you are trading—exchanging some item for money. Imagine your world without trade. A good start would be to put yourself in the place of Tom Hanks's character in the movie *Cast Away*. If you've seen the movie, you can remember the scene where he was able to rub two sticks together to create fire. From then on, he had some light at night and some means for cooking food. But until then, he went to sleep when it became dark and he woke up in a small, drafty tent-house that he had put together. So here you are in Hanks's place. All alone, you would get clothes only by utilizing items that you had found. You might be able to create some tea or coffee from something you had grown and eat something that you had caught or raised, but you would spend all your waking hours just trying to survive. An attempt to create a fishing net or some other tool would mean not gathering food that was available. Compare that type of existence to what you have today, and you are measuring the cumulative gains from trade. Society would have remained hunter-gatherers had it not been for trade.

2.c. Comparative Advantage

We have seen that the choice of which area or activity to specialize in is made on the basis of opportunity costs. Economists refer to the ability of one person or nation to do something with a lower opportunity cost than another as comparative advantage.



# ECONOMIC INSIGHT



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## Comparative Advantage

*(Salute Science for This One: Women Are Better at Ironing)*

"According to a new study, women proved themselves innate domestic goddesses in a series of household tasks—threading a needle, making a bed, and ironing—beating their male counterparts in three-minute trials for each activity. But men, ever-handy specimens they are, fared better at reading maps, changing a tire, and pitching a tent. The study was carried out by research analysts MindLab International and featured more than 1,200 adults. It found clear divisions in what men and women could complete in just three minutes from a selection of various tasks. Women could iron two shirts far more adeptly in the time limit. Overall they excelled in those jobs which needed speedy hand-to-eye co-ordination and verbal reasoning, such as threading six needles or winning an argument with logic. Men, in contrast, did better at those jobs which needed what researchers call spatial awareness, such as map reading, understanding self assembly instructions, and putting up a tent."

Many readers of the blog were upset that this seemed to demean women, that they are destined to stay home

and do home chores—remain barefoot and pregnant. According to the study, women have an absolute advantage in ironing, but it does not mean that they have a comparative advantage. Men can change tires better than women, and women can iron better than men. Women have both an absolute and a comparative advantage in ironing, and men have both an absolute and comparative advantage at changing tires. But suppose women can iron 10 shirts in the same time they can change 2 tires while men can iron 10 shirts in the same time they can change 1 tire. In this case the opportunity cost of ironing 1 shirt is .02 tires for women and .01 for men. Men have a comparative advantage in ironing. So it is comparative advantage that determines specialization, not absolute advantage.

Source: Lauren Bans, Slate.com XX Factor. Tuesday, March 16, 2010.



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Mexico has a comparative advantage in low-skilled, low-wage workers relative to the United States. Free trade means that Mexico should specialize in those activities requiring low-skilled, low-wage workers. However, Mexico's government has intervened in the country's economy to such an extent that resources cannot flow to where their value is highest. As a result, many of the labor resources have to leave Mexico in order to be able to earn a living.

Comparative advantage applies to every case of trade or exchange. This sometimes seems counterintuitive. Shouldn't countries that have lots of natural resources and a skilled labor force do everything themselves? The answer is no. Even though the United States has many more natural resources and a much larger and better-educated population than Grenada, Grenada has a comparative advantage in producing spices. The United States could produce more of everything than Grenada, but the opportunity cost of producing spices is higher in the United States than it is in Grenada. Both Grenada and the United States gain by having Grenada specialize in spice production and trade with the United States.

If you go around the world and look at what goods and services are traded, you can usually identify the comparative advantage. Some trade occurs simply because a country has

more of something. Saudi Arabia trades oil because it has more than anyone else. But countries don't have to have more of something for there to be gains from trade. They simply have to do something at a lower cost than another country. For instance, most developing nations have a comparative advantage in activities that use unskilled labor. Unskilled labor is much less expensive in Mexico, China, India, Pakistan, Bangladesh, and many other countries than in the United States. So gains from trade occur when these countries do things that use unskilled labor and then trade with the United States for foodstuffs or high-technology goods. The United States is sending many unskilled speaking jobs, such as telephone call agents, to India because Indians speak English and their wages are low.

Trade is not based solely on wage differences. Most trade in the world occurs between industrial or developed nations rather than between a developed and a less-developed nation. Each of the nations has comparative advantages in some goods and services. Germany might have a comparative advantage in engineering automobiles, Denmark in producing Havarti cheese, France in wine, Switzerland in banking, and so on. Each country gains by specializing according to comparative advantage and then trading.

*Individuals specialize in the activity in which their opportunity costs are lowest.*

## 2.d. Private Property Rights

Each of us will specialize in some activity, earn income, and then trade our output (or income) for other goods and services that we want. Specialization and trade ensure that we are better off than we would be if we did everything ourselves. *Specialization according to comparative advantage followed by trade allows everyone to acquire more of the goods they want.* But, for trade to occur, we must have confidence that we own what we create, and that what we own cannot be taken away. **Private property rights** are necessary for trade to occur. If I order a pizza to be delivered by Papa John's to my house, but anyone can come over and eat it when it arrives, I won't have an incentive to order any pizzas. If I can live in a house, but I can't own it, I have no incentive to take care of it. Private property rights refer to the right of ownership, and it requires a legal system of laws and courts and police to ensure ownership. If someone steals my car, someone will be penalized, since stealing a car is against the law. And if someone mugs me, takes my wallet, and leaves me bleeding on the sidewalk, that is theft of person and property and is also against the law. I have ownership rights to my body, to my assets, and to the things I have bought.

**private property right**  
The right of ownership.

If no one owns something, no one has the incentive to take care of it. An example is presented in the Land Titling in Argentina case discussed in the following Economics Insight box. Consider the fish in the ocean. No one owns the fish, and hence, no one has the incentive to protect them, raise them, and ensure that future generations of fish exist. Someone has to own an item for someone to care for it. Also, it is *private* property rights that count, not *public* property rights. If no one owns something, no one takes care of it. But equally, if everyone owns something, no one has an incentive to take care of it. In the former Soviet Union, the government owned virtually everything. No one had an incentive to take care of anything. As a result, housing was decrepit and dingy, industries were inefficient and run down, chemicals were dumped in the rivers and on the land, the air was polluted, and, in general, standards of living were very low.

## RECAP

1. Marginal cost is the incremental amount of one good or service that must be given up to obtain one additional unit of another good or service.
2. The rule of specialization is: specialize where the opportunity cost is lowest.
3. Comparative advantage exists whenever one person (firm, nation) can do something with lower opportunity costs than some other individual (firm, nation) can.
4. Specialization and trade enable individuals, firms, and nations to get more than they could without specialization and trade. This is called *gains from trade*.
5. Private property rights are necessary for voluntary trade to develop. Private property rights refer to the laws, courts, and police required to enforce the prohibition of theft and murder.



# ECONOMIC INSIGHT



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## The Importance of Private Property Rights

There are many real-life cases showing the importance of property rights in the behavior and standards of living of people. In Korea, those who have lived under private property rights and economic freedom (South Korea) have flourished economically relative to those grinding out tough lives under a despotic regime that allows no freedom and no private property (North Korea). Korea was occupied by Japan from 1905 until it was divided into two countries following World War II. North Korea retained a strong version of communism and totalitarianism, while South Korea slowly moved in the direction of private property rights and, eventually, political democracy. The differences in economic growth and changes in standards of living during the past 30 years are astounding. North Korea is mired in poverty, unable to feed its population. The economy is in such shambles that more than 2 million people have starved to death and more than 60 percent of the children are malnourished. South Koreans enjoy a standard of living far higher than that of North Korea.

In Buenos Aires, Argentina, a group of squatters organized by a Catholic chapel took over some vacant land as their residences.<sup>1</sup> Some of the squatters were able to obtain property rights while others were not. After about 20 years, the differences between the lives of those with property rights and those without were substantial. Those with property rights invested in their properties, while those without property rights did not. The result was that there is a significant difference in housing quality between the owned and unowned properties. The owned properties were upgraded, expanded, and improved. The unowned properties were run-down, crumbling shanties. The really amazing thing, though, is that those with ownership behaved so differently than those without ownership: They had fewer children and

the children acquired more education and had better health. Why does a title make a difference?

The problem with a lack of property rights or a system in which property rights are not secure and established is that people cannot use the property for collateral or cannot expect to get anything back if they invest in the property.

In the 1930s, the Finns and Estonians enjoyed a similar standard of living. The two countries are virtually neighbors. Their languages share a common linguistic root, they are culturally similar, and they share many values. In 2000, the average Finn earned two and a half times to more than seven times what the average Estonian earned. Fifty years of Communist rule surely had something to do with the gap in incomes that opened between the two countries. In the past, substantial differences existed between the standard of living in East and West Germany—two countries with essentially the same resources, education, culture, language, religion, history, and geography. Despite its own recent economic miracle, China's real per-capita GDP in 2000 was still just under \$4,000. Taiwan's is over \$17,000, more than four times China's.<sup>2</sup> In each of these comparisons, culture, language, and traditions are the same. Outcomes are markedly different. The countries with private property rights grew richer; the others faltered or went backwards.

<sup>1</sup> See the study by Sebastian Galiani and Ernesto Schargrotsky, "Property Rights for the Poor: Effects of Land Titling," Coase Institute Working Paper, August 9, 2005, for a complete discussion of this and other issues related to the Argentine case.

<sup>2</sup> Gerald P. O'Driscoll Jr. and Lee Hoskins, "Property Rights: The Key to Economic Development," Policy Analysis No. 482, Cato Institute, August 7, 2003.

## SUMMARY

### 1. What are opportunity costs? Are they part of the economic way of thinking?

- Opportunity costs are the forgone opportunities of the next best alternative. Choice means both gaining something and giving up something. When you choose one option, you forgo all others. The benefits of the next best alternative are the opportunity costs of your choice. §1

### 2. What is a production possibilities curve?

- A production possibilities curve (PPC) represents the trade-offs involved in the allocation of scarce resources. It shows the maximum quantity of goods and services that can be produced using limited resources to the fullest extent possible. §1.b

### 3. Why does specialization occur?

- Comparative advantage accounts for specialization. We specialize in the activities in which we have the lowest opportunity costs, that is, in which we have a comparative advantage. §2.c

### 4. What are the benefits of trade?

- Voluntary trade enables people to get more than they could get by doing everything themselves. The amount they get by specializing and trading is called gains from trade. §2.b.1

- Specialization and trade enable those involved to acquire more than they could if they did not specialize and engage in trade. §2.c
- Private property rights are necessary for voluntary trade to occur. Private property rights refer to the legal system that ensures that people own their persons and their property. Others cannot steal that property or harm that person. §2.d

## KEY TERMS

comparative advantage, 28  
gains from trade, 28  
marginal cost, 27

marginal opportunity cost, 27  
opportunity costs, 23  
private property rights, 31

production possibilities curve (PPC), 23  
trade-off, 23

## EXERCISES

1. In most political campaigns, candidates promise more than they can deliver. In the United States, both Democrats and Republicans promise better health care, a better environment, only minor reductions in defense, better education, an improved system of roads, bridges, sewer systems, water systems, and so on. What economic concept do candidates ignore?
2. Janine is an accountant who makes \$30,000 a year. Robert is a college student who makes \$8,000 a year. All other things being equal, who is more likely to stand in a long line to get a concert ticket? Explain.
3. In 2009, President Barack Obama and Congress enacted a budget that included increases in spending for the war in Iraq and national defense, as well as huge increases in welfare programs, education, and many other programs. The budget expenditures exceeded the revenues by over a trillion dollars. The argument was that “we need these things,” and therefore there is no limit to what the government should provide. Is there a limit? What concept is ignored by those politicians who claim that there is no limit to what the government should provide?
4. The following numbers measure the trade-off between grades and income:

| Total Hours | Hours Studying | GPA | Hours Working | Income |
|-------------|----------------|-----|---------------|--------|
| 60          | 30             | 2.0 | 30            | \$150  |
| 60          | 10             | 1.0 | 50            | \$250  |
| 60          | 0              | 0.0 | 60            | \$300  |

- a. Calculate the opportunity cost of an increase in the number of hours spent studying in order to earn a 3.0 grade point average (GPA) rather than a 2.0 GPA. (Assume linear relationships.)
  - b. Is the opportunity cost the same for a move from a 0.0 GPA to a 1.0 GPA as it is for a move from a 1.0 GPA to a 2.0 GPA?
  - c. What is the opportunity cost of an increase in income from \$100 to \$150?
5. Suppose a second individual has the following trade-offs between income and grades:

| Total Hours | Hours Studying | GPA | Hours Working | Income |
|-------------|----------------|-----|---------------|--------|
| 60          | 50             | 4.0 | 10            | \$ 60  |
| 60          | 40             | 3.0 | 20            | \$120  |
| 60          | 20             | 2.0 | 40            | \$240  |
| 60          | 10             | 1.0 | 50            | \$300  |
| 60          | 0              | 0.0 | 60            | \$360  |



- a. Define comparative advantage.
  - b. Does either individual (the one in exercise 4 or the one in exercise 5) have a comparative advantage in both activities?
  - c. Who should specialize in studying and who should specialize in working?
6. A doctor earns \$250,000 per year, while a professor earns \$40,000. They play tennis against each other each Saturday morning, each giving up a morning of relaxing, reading the paper, and playing with their children. They could each decide to work a few extra hours on Saturday and earn more income. But they choose to play tennis or to relax around the house. Are their opportunity costs of playing tennis different?
7. Plot the PPC of a nation given by the following data.

| Combination | Health Care | All Other Goods |
|-------------|-------------|-----------------|
| A           | 0           | 100             |
| B           | 25          | 90              |
| C           | 50          | 70              |
| D           | 75          | 40              |
| E           | 100         | 0               |

- a. Calculate the marginal opportunity cost of each combination.
- b. What is the opportunity cost of combination C?
- c. Suppose a second nation has the following data. Plot the PPC, and then determine which nation has the comparative advantage in which activity. Show whether the two nations can gain from specialization and trade.

| Combination | Health Care | All Other Goods |
|-------------|-------------|-----------------|
| A           | 0           | 50              |
| B           | 20          | 40              |
| C           | 40          | 25              |
| D           | 60          | 5               |
| E           | 65          | 0               |

8. A doctor earns \$200 per hour, a plumber \$40 per hour, and a professor \$20 per hour. Everything else the same, which one will devote more hours to negotiating the price of a new car? Explain.
9. Perhaps you've heard of the old saying, "There is no such thing as a free lunch." What does it mean? If someone invites you to a lunch and offers to pay for it, is it free to you?
10. You have waited 30 minutes in a line for the Star Tours ride at Disneyland. You see a sign that says,

"From this point on, your wait is 45 minutes." You must decide whether to remain in the line or to move elsewhere. On what basis do you make the decision? Do the 30 minutes you've already stood in line come into play?

11. A university is deciding between two meal plans. One plan charges a fixed fee of \$600 per semester and allows students to eat as much as they want. The other plan charges a fee based on the quantity of food consumed. Under which plan will students eat the most?
12. Evaluate this statement: "You are a natural athlete, an attractive person who learns easily and communicates well. Clearly, you can do everything better than your friends and acquaintances. As a result, the term *specialization* has no meaning for you. Specialization would cost you rather than benefit you."
13. During China's Cultural Revolution in the late 1960s and early 1970s, highly educated people were forced to move to farms and work in the fields. Some were common laborers for eight or more years. What does this policy say about specialization and the PPC? Would you predict that the policy would lead to an increase in output?
14. In elementary school and through middle school, most students have the same teacher throughout the day and for the entire school year. Then, beginning in high school, different subjects are taught by different teachers. In college, the same subject is often taught at different levels—freshman, sophomore, junior-senior, or graduate—by different faculty. Is education taking advantage of specialization only from high school on? Comment on the differences between elementary school and college and the use of specialization.
15. The top officials in the federal government and high-ranking officers of large corporations often have chauffeurs to drive them around the city or from meeting to meeting. Is this simply one of the perquisites of their position, or is the use of chauffeurs justifiable on the basis of comparative advantage?
16. In Botswana, Zimbabwe, and South Africa, individuals can own and farm elephants. In other African countries, the elephants are put on large reserves. Explain why the elephant population in Botswana, Zimbabwe, and South Africa has risen, whereas that in the rest of Africa has fallen.

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

# FLAT OWNERS TAKE TO BARRICADES AS CHÁVEZ SEIZES PRIVATE ASSETS

*The Times (London), November 12, 2010*

**H**ugo Chávez is speeding up his seizure of assets before newly elected opposition members of parliament take their seats in January.

The President of Venezuela is now trying to address a housing shortage by grabbing control of private residential apartment blocks.

The left-wing leader has redoubled efforts to extend state control over the economy after a major electoral setback in September in which opposition parties wiped out the two-thirds majority that he needs to overturn existing legislation. Since then, 26 companies have been effectively nationalised, including Owens-Illinois, the U.S. glassmaker; Sidetur, a steelmaker; five milk distributors; and Venezuela's largest agricultural supplier.

President Chávez has been forced to defend himself against accusations that he has no respect for individual property after seizing six residential apart-

ment blocks and the "temporary occupation" of a further eight in cities including Caracas.

He has justified the expropriation of the properties by arguing that the construction companies that built them had either left the flats unfinished or had been badly delayed in completing them. He said that the moves represented an "act of justice," and accused construction and property companies of organised crime, arguing that by charging homebuyers high rates of interest on unfinished apartments, they were guilty of fraud.

At the weekend, residents of one complex that has been seized issued a statement insisting that the construction company had not reneged on its obligations.

"We strongly reject the expropriation measure," they said. Residents of the largely middle-class blocks have hastily implemented security to keep officials out, organising round-the-clock surveillance and putting sirens at entrances.

Critics, including Venezuela's largest business chamber, said that the measure would scare off investment and put at risk the construction this year of 52,000 homes by private companies. Venezuela faces a record housing shortage of 2 million homes.

Julio Borges, the opposition politician, accused Mr. Chávez of trampling over private-property rights and steering Venezuela towards Cuba-style communism. Mr. Borges told a news conference on Sunday that Venezuelans did not want to live in a "country of slaves, where the Government is the owner of everything and the people aren't owners of anything."

The Government compensates owners for loss of property, but companies whose assets have been seized say that payment is slow and often very low.

HANNAH STRANGE

**Source:** © Hannah Strange, NI Syndication Limited, November 12, 2010.

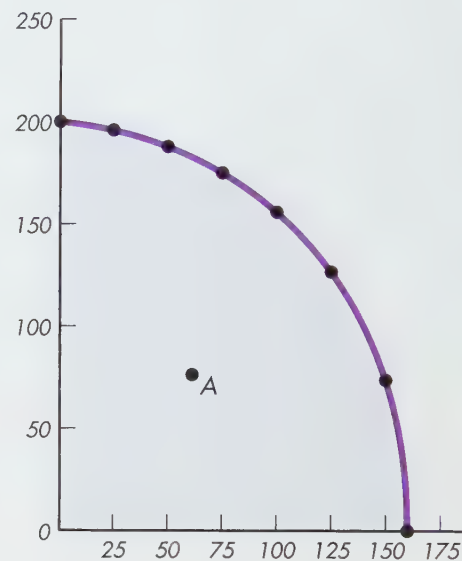


There is a story that goes something like this: Everybody, Somebody, Anybody, and Nobody were faced with an important task. Everybody was sure that Somebody would do it. Anybody could have done it, but Nobody did it. Somebody got angry about that because it was Everybody's job. Everybody thought Anybody could do it. But Nobody realized that Everybody wouldn't do it. The end result was that Everybody blamed Somebody when Nobody did what Anybody could have done.

The story points out that if you own something, you have an incentive to take care of it. When no one owns something or when everyone owns something, no one has an incentive to take care of it. That is what private property rights are all about: They ensure individual ownership, thereby providing incentive to care for what is owned. When all housing in China's major cities was owned by the government, the houses and apartments were not taken care of. But, as soon as China allowed some private ownership of apartments, the improvements were amazing—clean and lighted hallways, and other improvements in the buildings. Similarly, in the low- to no income projects of the large cities in the eastern United States, where apartments are owned by the government, the poor have no incentive to ensure that the housing is cared for. But when the projects are sold to private owners, the apartments are improved and cared for.

The PPC shows combinations of two goods, services, or activities that people can devote their resources to producing. Points along the curve are all possible combinations of two goods that can be produced using an individual's resources fully and efficiently. If you can own what you create, you have an incentive to produce somewhere along the PPC. But, if you don't own what you create, why should you worry about whether you are using resources efficiently or fully? You will operate at a point inside the PPC, such as point A. You will produce less than you are capable of producing. Because you

will produce less, you will have no incentive to specialize and trade—you don't own what you produce, so you don't care whether it is in accordance with comparative advantage. There is nothing to trade because you own nothing.



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In Venezuela, the problem is that the poor own nothing. Over 75 percent of the population in most Latin American nations do not hold title to the property on which their houses rest or the fields in which they labor. Without ownership, there is no incentive to improve the property. It is no different for the apartment owners—when they do not own their property, they have no incentive to take care of it. Why should any private apartment owner in Venezuela invest in the property, maintain it, or even improve it? The direction in which Chavez is taking Venezuela is the direction in which Castro took Cuba, Mao took China, and Lenin, Stalin, and others took Russia. The result is a shrinking PPC and a reduction in standards of living.

## CHAPTER 3

# Markets, Demand and Supply, and the Price System

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### FUNDAMENTAL QUESTIONS

- 1 How do we decide who gets the scarce goods and resources?
- 2 What is demand?
- 3 What is supply?
- 4 How is price determined by demand and supply?
- 5 What causes price to change?
- 6 What happens when price is not allowed to change with market forces?

**P**eople (and firms and nations) can get more if they specialize in certain activities and then trade with one another to acquire the goods and services that they desire than they can if they do everything themselves. This is what we described in the previous chapter as gains from trade. But how does everyone get together to trade? Who decides who specializes in what, and who determines who gets what?

In some countries, the government decides who gets what and what is produced. In India until the mid-1990s, in the Soviet Union from 1917 until 1989, in China at least until 1980, and in Cuba, Venezuela, and Cameroon and other African



nations today, a few government officials dictate what is produced, by whom it is produced, where it is produced, what price it sells at, and who may buy it.

In most developed or industrial nations, government officials dictate what, how, for whom, and at what price a few things are produced, but for most goods and services, private individuals decide. When you walk into your local Starbucks to get a tall coffee, do you wonder who told the people working there to work there, or who told the coffee growers to send their coffee beans to this particular Starbucks, or who told the bakery to provide this Starbucks with croissants? Probably not. Most of us take all these things for granted. Yet, it is a remarkable phenomenon—we get what we want, when we want it, and where we want it. How does this work? It is the market process; no one dictates what is produced, how it is produced, the price at which it sells, or who buys it. All this occurs through the self-interested behavior of individuals interacting in a **market**.

The term *market* refers to the interaction of buyers and sellers. A market may be a specific location, such as the supermarket, or it may be the exchange of particular



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A market arises when buyers and sellers exchange a well-defined good or service. In the case of a supermarket like this one, buyers purchase groceries and household items. The market occurs in a building at a specific location.

#### **market**

A place or service that enables buyers and sellers to exchange goods and services.



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In the case of the flower market, shoppers can examine the day's assortment and make their choices. This flower market does not occur at a specific location nor in a fixed building.

goods or services at many different locations, such as the foreign exchange market. A market makes possible the exchange of goods and services. It may be a formally organized exchange, such as the New York Stock Exchange, or it may be loosely organized, like the market for used bicycles or automobiles. A market may be con-

fined to one location, as in the case of a supermarket, or it may encompass a city, a state, a country, or the entire world, such as the market for foreign exchange.

In this chapter, we discuss the allocation of goods and services—how it is determined what is produced and who gets what.

## 1. Allocation Systems

An allocation system is the process of determining who gets the goods and services and who doesn't. There are many different allocation systems that we might use. One is to have someone, say the government, determine who gets what, as in Cuba or Cameroon. Another is to have a first-come, first-served system, where those who arrive first get the goods and services. A third is to have a lottery, with the lucky winners getting the goods and services. A fourth is the market or price system, where those with the incomes are able to buy the goods and services. Which is best? Take the quiz on the next page, and then we'll discuss allocation systems some more.



**1** How do we decide who gets the scarce goods and resources?

### 1.a. Fairness

How did you respond to the four questions in each scenario? If you are like most people, you believe that the price on the bottles of water ought to be raised and that the first patients showing up at the doctor's office ought to get service. Very few believe that the price or the market ought to be used to allocate important items like health care. Most claim that the price system is not fair. Yet none of the allocation approaches is "fair" if fairness means that everyone gets what he or she wants. In every case, someone gets the good or service and someone does not. This is what scarcity is all about—there is not enough to go around. With the market system, it is those without income or wealth who must do without. Is this fair? No. Under the first-come, first-served system, it is those who arrive later who do without. This isn't fair either, since those who are slow, old, disabled, or otherwise not first to arrive won't get the goods and services. Under the government scheme, it is those who are not in favor or those who do not match up with the government's rules who do without. In the former Soviet Union, Cuba, Cameroon, and other government-run countries, it is the government officials who get most of the goods and services through what we call corruption, graft, and bribes. And, with a random procedure, it is those who do not have the lucky ticket or the correct number who are left out.

None of these allocation systems is fair in the sense that no one gets left out. Scarcity means that someone gets left out. Only if your measure of fair is equal opportunity is the lottery system fair. When everything is allocated by lottery, everyone has an equal chance of winning. But otherwise, life is not fair.



## Allocation Quiz

- I. At a sightseeing point reachable only after a strenuous hike, a firm has established a stand where bottled water is sold. The water, carried in by the employees of the firm, is sold to thirsty hikers in six-ounce bottles. The price is \$1 per bottle. Typically, only 100 bottles of the water are sold each day. On a particularly hot day, however, 200 hikers each want to buy at least one bottle of water. Indicate what you think of each of the following means of distributing the water to the hikers by responding to each allocation approach with one of the following five responses:
  - a. Agree completely
  - b. Agree with slight reservation
  - c. Disagree
  - d. Strongly disagree
  - e. Totally unacceptable
  1. Increasing the price until the quantity of bottles of water that hikers are willing and able to purchase exactly equals the number of bottles available for sale
  2. Selling the water for \$1 per bottle on a first-come, first-served basis
  3. Having the local authority (government) buy the water for \$1 per bottle and distribute it according to its own judgment
  4. Selling the water for \$1 per bottle following a random selection procedure or lottery
- II. A physician has been providing medical services at a fee of \$100 per patient and typically sees 30 patients per day. One day the flu bug has been so vicious that the number of patients attempting to visit the physician exceeds 60. Indicate what you think of each of the following means of distributing the physician's services to the sick patients by responding with one of the following five responses:
  - a. Agree completely
  - b. Agree with slight reservation
  - c. Disagree
  - d. Strongly disagree
  - e. Totally unacceptable
  1. Raising the price until the number of patients the doctor sees is exactly equal to the number of patients who are willing and able to pay the doctor's fee
  2. Selling the services for \$100 per patient on a first-come, first-served basis
  3. Having the local authority (government) pay the physician \$100 per patient and choose who is to receive the services according to its own judgment
  4. Selling the physician's services for \$100 per patient following a random selection procedure or lottery

## 1.b. Incentives

Since each allocation mechanism is unfair, how do we decide which to use? One way might be by the incentives that each creates. Do the incentives lead to behavior that will improve things, increase supplies, and raise standards of living?

With the first-come, first-served allocation scheme, the incentive is to be first. You have no reason to improve the quality of your products or to increase the value of your resources. There is no incentive to increase the amounts of goods and services supplied. Why would anyone produce when all everyone wants is to be first? As a result, with a first-come, first-served allocation system, growth will not occur, and

standards of living will not rise. A society based *solely* on first-come, first-served would die a quick death.

A government scheme provides an incentive either to be a member of government and thus help determine the allocation rules or to do exactly what the government orders you to do. There are no incentives to improve production and efficiency or to increase the quantities supplied, and thus there is no reason for the economy to grow. This type of system is a failure, as evidenced by the Soviet Union, Mao Tse-Tung's China, Cuba, and socialist systems in Latin America and Africa and in virtually every poor country in the world.

The random allocation system incentivizes you to do nothing—you simply hope that manna from heaven falls on you.

With the market system, the incentive is to acquire purchasing ability—to obtain income and wealth. This means that you must provide goods that have high value to others and provide resources that have high value to producers—to enhance your worth as an employee by acquiring education or training, and to enhance the value of the resources you own.

Very importantly, the market system also provides incentives for quantities of scarce goods to increase. In the case of the water stand in Scenario I, if the price of the water increases and the owner of the water stand is earning significant profits, others may carry or truck water to the top of the hill and sell it to thirsty hikers; the amount of water available thus increases. In the case of the doctor in Scenario II, other doctors may think that opening an office near the first might be a way to earn more; the amount of physician services available increases. Since the market system creates the incentive for the amount supplied to increase, economies grow and expand, and standards of living improve. The market system also ensures that resources are allocated to where they are most highly valued. If the price of an item rises, consumers may switch to another item, or another good or service, that can serve about the same purpose. When consumers switch, production of the alternative good rises, and thus the resources used in its production must increase as well. As a result, resources are reallocated from lower-valued uses to higher-valued uses.

### 1.c. The Market Process: Arbitrage

When the Mazda Miata was introduced in the United States in 1990, the little sports roadster was an especially desired product in southern California. As shown in Figure 1, the suggested retail price was \$13,996, the price at which it was selling in Detroit. In Los Angeles, the purchase price was nearly \$25,000. Several entrepreneurs recognized the profit potential in the \$10,000 price differential and sent hundreds of students to Detroit to pick up Miatas and drive them back to Los Angeles. Within a reasonably short time, the price differential between Detroit and Los Angeles was reduced. The increased sales in Detroit drove the price there up, while the increased number of Miatas being sold in Los Angeles reduced the price there. The price differential continued to decline until it was less than the cost of shipping the cars from Detroit to Los Angeles. This story of the Mazda Miata illustrates how markets work to allocate scarce goods, services, and resources. A product is purchased where its price is low and sold where its price is high. As a result, resources devoted to that product flow to where they have the highest value. The same type of situation occurred with the introduction of the Mini Cooper in 2001. The car was selling for much more in California than in New York and Chicago, so people purchased the cars in Chicago or New York and had the cars shipped to California.



**FIGURE 1** Price Arbitrage: Miata

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Suppose an electronics firm is inefficient, its employees are surly, and its products are not displayed well. To attempt to earn a profit, the firm charges more than the efficiently run firm down the street. Where do customers go? Obviously, they seek out the best deal and go to the more efficient firm. The more efficient store has to get more supplies, hire more employees, acquire more space, and so on. The inefficient store lays off employees, sells used equipment, and gets rid of its inventory. The resources thus go from where they were not as highly valued to where they are most highly valued.

Why does the market process work? For a very simple reason: People are looking for the best deal—the highest-quality products at the lowest prices. So when an opportunity for a “best deal” arises, people respond to it by purchasing where the price is low and selling where the price is high.

As long as the market is free to change, it will ensure that resources are allocated to where they have the highest value and people get what they want at the lowest price. But what happens if something interferes with the market process? Each year *The Economist* magazine<sup>1</sup> publishes its Big Mac Index. This index lists the price of a Big Mac in many different countries. Adjusting for different currencies, one year the index looked something like Figure 2.

What do you bright entrepreneurs see? That’s right—an arbitrage opportunity: You could load up a Boeing 747 with Big Macs in Phoenix and fly to Tokyo and sell the Big Macs for a nice profit. The larger supply in Tokyo would reduce the Tokyo price, and the greater demand in Phoenix would raise the price there. Why does that not happen? Part of the reason might be that the food is not portable; it deteriorates in the airplane. Another reason is that regulations would not allow it: Japan would not allow someone to simply land on the tarmac and begin selling Big Macs out of a cargo hold. Arbitrage in the movement of Big Macs does not take place because regulations interfere with the market process. So, when something interferes with the market process, resources do not go to where they are most highly valued, and consumers don’t get what they want at the lowest prices.

<sup>1</sup> [http://www.economist.com/markets/indicators/displaystory.cfm?story\\_id=12991434](http://www.economist.com/markets/indicators/displaystory.cfm?story_id=12991434), accessed January 22, 2009.

**FIGURE 2** A Big Mac Index

The price of a Big Mac in four different cities after adjusting for currency differences.

## RECAP

1. Scarce goods and resources can be allocated in many different ways. Four common approaches are first-come, first-served; prices; government; and random.
2. No allocation mechanism is fair in the sense that everyone gets everything they want. This would defy the idea of scarcity. Some people will get the goods and resources and others will not.
3. The incentives each allocation system creates is a fundamental reason that markets are selected to do the allocation. Only a market system creates the incentives that lead to increasing standards of living.

## 2. Markets and Money

The market process refers to the way that scarce goods and services are allocated through the individual actions of buyers and sellers. The price adjusts to the actions of buyers and sellers so as to ensure that resources are used where they have the highest value—the price of the Miata in Los Angeles declines as more Miatas end up in Los Angeles. The price measures the opportunity cost—how much has to be given up in order to get something else. If you pay a dollar for a cup of coffee, then the opportunity cost of that coffee is everything else that dollar could have been used to buy. In most cases, when you buy something you exchange money for that something. There are cases where you actually exchange one good for another—you might mow someone's lawn in exchange for them taking care of your house while you are on vacation. Every market exchange is not necessarily a monetary exchange.

### 2.a. Barter and Money Exchanges

The purpose of markets is to facilitate the exchange of goods and services between buyers and sellers. In some cases, money changes hands; in others, only goods and services are exchanged. Recall from the previous chapter that the cost (price) of something is what must be given up to acquire a unit of that something. If the price of a gallon of milk is \$2, then the cost of that gallon of milk is whatever would have been purchased with that \$2. Suppose that the \$2 would have been used to purchase one piece of



**barter**

The direct exchange of goods and services without the use of money.

**double coincidence of wants**

The situation that exists when A has what B wants and B has what A wants.

chocolate cake. Then we could say that the cost of a gallon of milk is one piece of chocolate cake. If we simply exchanged a gallon of milk for the piece of cake, we would be engaging in **barter**. The exchange of goods and services directly, without money, is called barter. Barter occurs when a plumber fixes a leaky pipe for a lawyer in exchange for the lawyer's work on a will or when a Chinese citizen provides fresh vegetables to a U.S. visitor in exchange for a pack of U.S. cigarettes.

Most markets involve money because goods and services can be exchanged more easily with money than without it. Economists say the costs of transacting are lower with money than without it. When IBM purchases microchips from Yakamoto of Japan, IBM and Yakamoto don't exchange goods directly. Neither firm may have what the other wants. Barter requires a **double coincidence of wants**: IBM must have what Yakamoto wants, and Yakamoto must have what IBM wants. The difficulty of finding a double coincidence of wants for barter transactions is typically very high. Using money makes trading easier. To obtain the microchips, all IBM has to do is provide dollars to Yakamoto. Yakamoto is willing to accept the money, since it can spend that money to obtain the goods that it wants.

**RECAP**

1. Barter refers to exchanges made without the use of money.
2. Money makes it easier and less expensive to exchange goods and services.

**2 What is demand?****demand**

The amount of a product that people are willing and able to purchase at each possible price during a given period of time, everything else held constant.

**quantity demanded**

The amount of a product that people are willing and able to purchase at a specific price.

**law of demand**

The quantity of a well-defined good or service that people are willing and able to purchase during a particular period of time decreases as the price of that good or service rises and increases as the price falls, everything else held constant.

## 3. Demand

A market consists of demand and supply—buyers and sellers. To understand how a price level is determined and why a price rises or falls, it is necessary to know how demand and supply function. We begin by considering demand alone, then supply, and then we put the two together. Before we begin, we discuss some economic terminology that is often confusing.

Economists distinguish between the terms **demand** and **quantity demanded**. When they refer to the *quantity demanded*, they are talking about the amount of a product that people are willing and able to purchase at a *specific* price. When they refer to *demand*, they are talking about the amount that people would be willing and able to purchase at *every possible* price. Demand is the quantities demanded at every price. Thus, the statement that “the demand for U.S. white wine rose following an increase in the price of French white wine” means that at each price for U.S. white wine, more people were willing and able to purchase U.S. white wine. They switched from the French wine to the U.S. wine. And the statement that “the quantity demanded of white wine fell as the price of white wine rose” means that people were willing and able to purchase less white wine because the price of the wine rose.

### 3.a. The Law of Demand

Consumers and merchants know that if you lower the price of a good or service without altering its quality or quantity, people will beat a path to your doorway. This simple truth is referred to as the **law of demand**.

According to the law of demand, people purchase more of something when the price of that item falls. More formally, the law of demand states that the quantity of some item that people are willing and able to purchase during a particular period of time decreases as the price rises, and vice versa.

The more formal definition of the law of demand can be broken down into five phrases:

1. The quantity of a well-defined good or service that
2. people are willing and able to purchase
3. during a particular period of time
4. decreases as the price of that good or service rises and increases as the price falls,
5. everything else held constant.

The first phrase ensures that we are referring to the same item, that we are not mixing different goods. A watch is a commodity that is defined and distinguished from other goods by several characteristics: quality, color, and design of the watch face, to name a few. The law of demand applies to a well-defined good, in this case, a watch. If one of the characteristics should change, the good would no longer be well defined—in fact, it would be a different good. A Rolex watch is different from a Timex watch; Polo brand golf shirts are different goods from a generic brand golf shirts; Mercedes-Benz automobiles are different goods from Saturn automobiles.

The second phrase indicates that not only must people *want* to purchase some good, but they must be *able* to purchase that good in order for their wants to be counted as part of demand. For example, Sue would love to buy a membership in the Paradise Valley Country Club, but because the membership costs \$35,000, she is not able to purchase the membership. Though she is willing, she is not able. At a price of \$5,000, however, she is willing and able to purchase the membership.

The third phrase points out that the demand for any good is defined for a specific period of time. Without reference to a time period, a demand relationship would not make any sense. For instance, the statement that “at a price of \$3 per Happy Meal, 13 million Happy Meals are demanded” provides no useful information. Are the 13 million meals sold in one week or one year? Think of demand as a rate of purchase at each possible price over a period of time—2 per month, 1 per day, and so on.

The fourth phrase points out that price and quantity demanded move in opposite directions; that is, as the price rises, the quantity demanded falls, and as the price falls, the quantity demanded rises.

Demand is a measure of the relationship between the price and quantity demanded of a particular good or service when the determinants of demand do not change. The **determinants of demand** are income, tastes, prices of related goods and services, expectations, and the number of buyers. If any one of these items changes, demand changes. The final phrase, everything else held constant, ensures that the determinants of demand do not change. We are focusing on the relationship between price and quantity demanded—everything else held constant.

#### **determinants of demand**

Factors other than the price of the good that influence demand— income, tastes, prices of related goods and services, expectations, and number of buyers.

### **3.b. The Demand Schedule**

A **demand schedule** is a table or list of prices and the corresponding quantities demanded for a particular good or service. Consider the demand for access time to online games. Console games made their debut in the 1970s, but it has been in the first decade of this century in which the growth of online games or interactive console games has really exploded. There are different formats and ways to download games and access networks, but let us deal with a simple setting wherein you can purchase access to a network featuring games such as World of Warcraft on a weekly basis. The table in Figure 3 is a demand schedule for hours of access to the games. It shows the number of hours per week that a consumer named Bob would be willing and able to buy at each price during a month, everything else held constant. As the price of the access time gets higher relative to the prices of other goods, Bob would be willing and able to purchase fewer access hours.

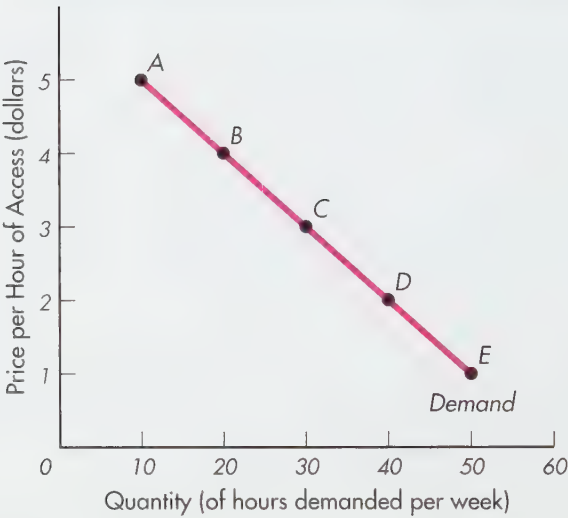
#### **demand schedule**

A table or list of prices and the corresponding quantities demanded for a particular good or service.



**FIGURE 3** Bob's Demand Schedule and Demand Curve for Hours of Access per Week

| Combination | Price per Hour (constant quality units) | Quantity Demanded per Week (constant quality units) |
|-------------|---|---|
| A           | \$5                                     | 10  |
| B           | \$4                                     | 20  |
| C           | \$3                                     | 30  |
| D           | \$2                                     | 40  |
| E           | \$1                                     | 50  |



The number of hours of access to online games that Bob is willing and able to buy at each price during the week is listed in the table, or the demand schedule. The demand curve is derived from the combinations given in the demand schedule. The price-quantity combination of \$5 per hour and 10 hours is point A. The combination of \$4 per hour and 20 hours is point B. Each combination is plotted, and the points are connected to form the demand curve.

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At a price of \$5 per hour, Bob indicates that he will purchase only 10 hours during the week. At a price of \$4, Bob tells us that he will purchase 20 hours during the week. As the price drops from \$5 to \$4 to \$3 to \$2 and to \$1, Bob is willing and able to purchase more access time. At a price of \$1, Bob would purchase 50 hours of access for the week.

3.c. The Demand Curve

**demand curve**  
A graph of a demand schedule that measures price on the vertical axis and quantity demanded on the horizontal axis.

A **demand curve** is a graph of the demand schedule. The demand curve shown in Figure 3 is plotted from the information given in the demand schedule. The price per hour of access time (price per unit) is measured on the vertical axis, and the number of hours of access per week (quantity per unit of time) is measured on the horizontal axis. The demand curve slopes downward because of the inverse relationship between the price and the quantity that Bob is willing and able to purchase. Point A in Figure 3 corresponds to combination A in the table: a price of \$5 and 10 hours per week demanded.

Similarly, points *B*, *C*, *D*, and *E* in Figure 3 represent the corresponding combinations in the table. The line connecting these points is Bob's demand curve for hours of access to a network game.

All demand curves slope down because of the law of demand: As price falls, quantity demanded increases. The demand curves for bread, electricity, automobiles, colleges, labor services, health care, and any other good or service you can think of slope down. You might be saying to yourself, "That's not true. When the price of some rock concerts goes up, more people want to attend the concert. As the ticket price goes up, going to the concert becomes more prestigious, and the quantity demanded actually rises." To avoid confusion in such circumstances, we say "everything else held constant." With this statement, we are assuming that tastes don't change and that, therefore, the goods *can-not* become more prestigious as the price changes. Similarly, we do not allow the quality or the brand name of a product to change as we define the demand schedule or demand curve. We concentrate on the one quality or the one brand; so when we say that the price of a good has risen, we are talking about a good that is identical at all prices.

### 3.d. From Individual Demand Curves to a Market Curve

Bob's demand curve for hours of access to a network game is plotted in Figure 3. Unless Bob is the only person who plays the game, his demand curve is not the total or market demand curve. Market demand is derived by adding up the quantities that everyone is willing and able to purchase at each price—the sum of all individual demands. The market demand curve is the horizontal sum of all individual demand curves of all consumers in the market. The table in Figure 4 lists the demand schedules of three individuals, Bob, Maria, and Liu. If these three were the only consumers in the market, then the market demand would be the sum of their individual demands, shown as the last column of the table.

Bob's, Maria's, and Liu's demand schedules are plotted as individual demand curves in Figure 4(a). In Figure 4(b), their individual demand curves have been added together to obtain the market demand curve for hours of access per week to a network game. (Notice that we add in a horizontal direction—that is, we add the quantities at each price, not the prices at each quantity.) At a price of \$5, we add the quantity that Bob would be willing and able to buy, 10, to the quantity that Maria would be willing and able to buy, 5, to the quantity that Liu would be willing and able to buy, 15, to get the market quantity demanded of 30. At a price of \$4, we add the quantities that each of the consumers is willing and able to buy to get the total quantity demanded of 48. At all prices, then, we add the quantities demanded by each individual consumer to get the total, or market quantity, demanded.

*When speaking of the demand curve or demand schedule, we are using constant-quality units. The quality of a good does not change as the price changes along a demand curve.*

### 3.e. Changes in Demand and Changes in Quantity Demanded

When one of the determinants of demand—income, tastes, prices of related goods, expectations, or number of buyers—is allowed to change, the demand for a good or service changes as well. What does it mean to say that demand changes? Demand is the entire demand schedule, or demand curve. When we say that demand changes, we are referring to a change in the quantities demanded at each and every price.

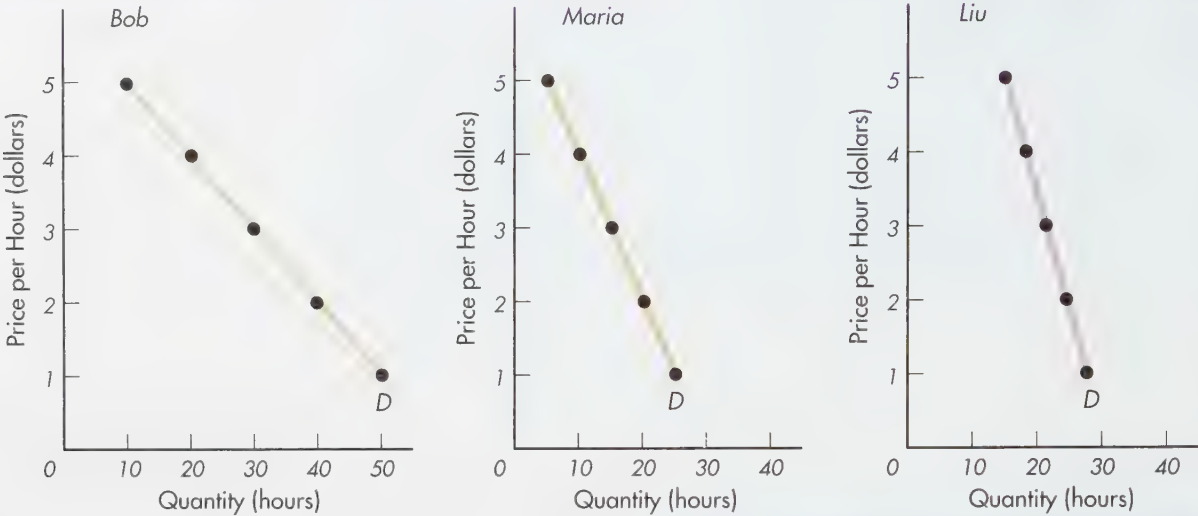
For example, if Bob's income rises, then he is willing and able to purchase more access time for the network game. At each and every price, the number of hours of access time that Bob is willing and able to buy each week rises. An increase in demand is expressed by a rightward shift of the demand curve, such as shown in Figure 5(a) in the move from  $D_1$  to  $D_2$ . Conversely, if Bob's income declined, then he would be willing

*A change in demand is represented by a shift of the demand curve.*

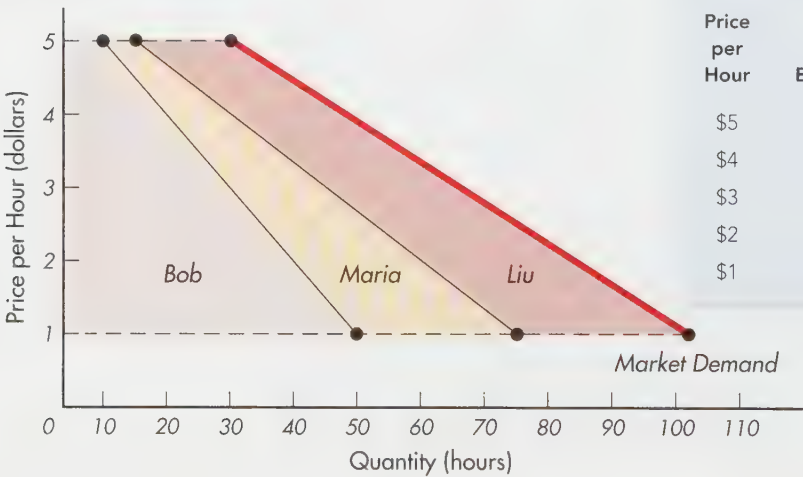


**FIGURE 4** The Market Demand Schedule and Demand Curve

(a) Individual Demand Curves



(b) Market Demand Curve



| Quantities Demanded<br>per Year by |     |       |     |                                |  |
|------------------------------------|-----|-------|-----|--------------------------------|--|
| Price<br>per<br>Hour               | Bob | Maria | Liu | Market<br>Quantity<br>Demanded |  |
| \$5                                | 10  | 5     | 15  | = 30                           |  |
| \$4                                | 20  | 10    | 18  | = 48                           |  |
| \$3                                | 30  | 15    | 21  | = 66                           |  |
| \$2                                | 40  | 20    | 24  | = 84                           |  |
| \$1                                | 50  | 25    | 27  | = 102                          |  |

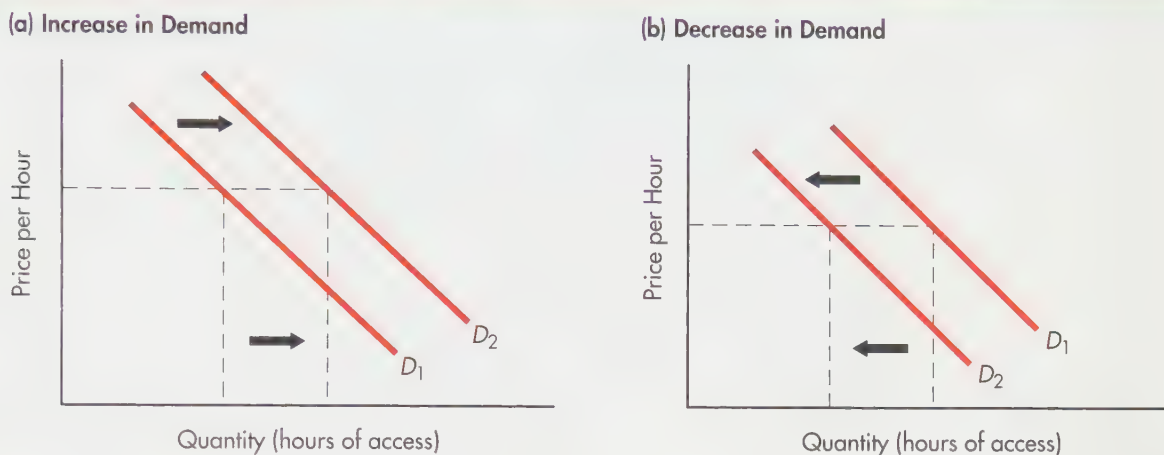
The market is defined to consist of three individuals: Bob, Maria, and Liu. Their demand schedules are listed in the table and plotted as the individual demand curves shown in Figure 4(a). By adding the quantities that each demands at every price, we obtain the market demand curve shown in Figure 4(b). At a price of \$1, we add Bob's quantity demanded of 50 to Maria's quantity demanded of 25 to Liu's quantity demanded of 27 to obtain the market quantity demanded of 102. At a price of \$2, we add Bob's 40 to Maria's 20 to Liu's 24 to obtain the market quantity demanded of 84. To obtain the market demand curve, for every price we sum the quantities demanded by each market participant.

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A change in quantity demanded is represented by a movement along one demand curve.

and able to purchase less access time. This decrease in demand is expressed as a leftward shift of the demand curve, as shown in Figure 5(b) in the move from  $D_1$  to  $D_2$ .

When the price of a good or service is the only factor that changes, the quantity demanded changes, but the demand curve does not shift. Instead, as the price of the access time is decreased (increased), everything else held constant, the quantity that people are willing and able to purchase increases (decreases). This change is merely a

**FIGURE 5** An Increase and a Decrease in Demand

In Figure 5(a), an increase in demand occurs due to an increase in income. The consumer is willing and able to purchase more at *every* price. This change is expressed as a rightward shift of the demand curve from  $D_1$  to  $D_2$ . Figure 5(b) shows a decrease in demand due to a decrease in income. The consumer is willing to purchase less at *every* price. This is illustrated as a leftward shift of demand from  $D_1$  to  $D_2$ .

movement from one point on the demand curve to another point on the same demand curve, not a shift of the demand curve. A *change in the quantity demanded* is the phrase that economists use to describe the change in the quantities of a particular good or service that people are willing and able to purchase as the price of that good or service changes. A change in the quantity demanded, from point *A* to point *B* on the demand curve, is shown in Figure 6(b). Compare this to a change in demand illustrated by the shift of the entire curve as shown in Figure 6(a).

The demand curve shifts when income, tastes, prices of related goods, expectations, or the number of buyers changes. Let's consider how each of these determinants of demand affects the demand curve.

**3.e.1. Income** The demand for any good or service depends on income. For most goods and services, the higher someone's income is, with everything else the same, the more that person can purchase at any given price. These are called **normal goods**. The increase in Bob's income causes his demand to increase. This change is shown in Figure 6(a) by the shift to the right from the curve labeled  $D_1$  to the curve labeled  $D_2$ . Increased income means a greater ability to purchase goods and services. At every price, more hours of access time are demanded along curve  $D_2$  than along curve  $D_1$ ; this is an increase in demand.

**normal goods**

Goods for which demand increases as income increases.

For some goods and services, however, the amount demanded declines as income rises, everything else the same. The reason could be that these are goods or services that people use only when their incomes are declining—such as bankruptcy services. In addition, people might not like the good or service as well as they like a more expensive good or service, so when their income rises, they purchase the more expensive items. These types of items are called **inferior goods**.

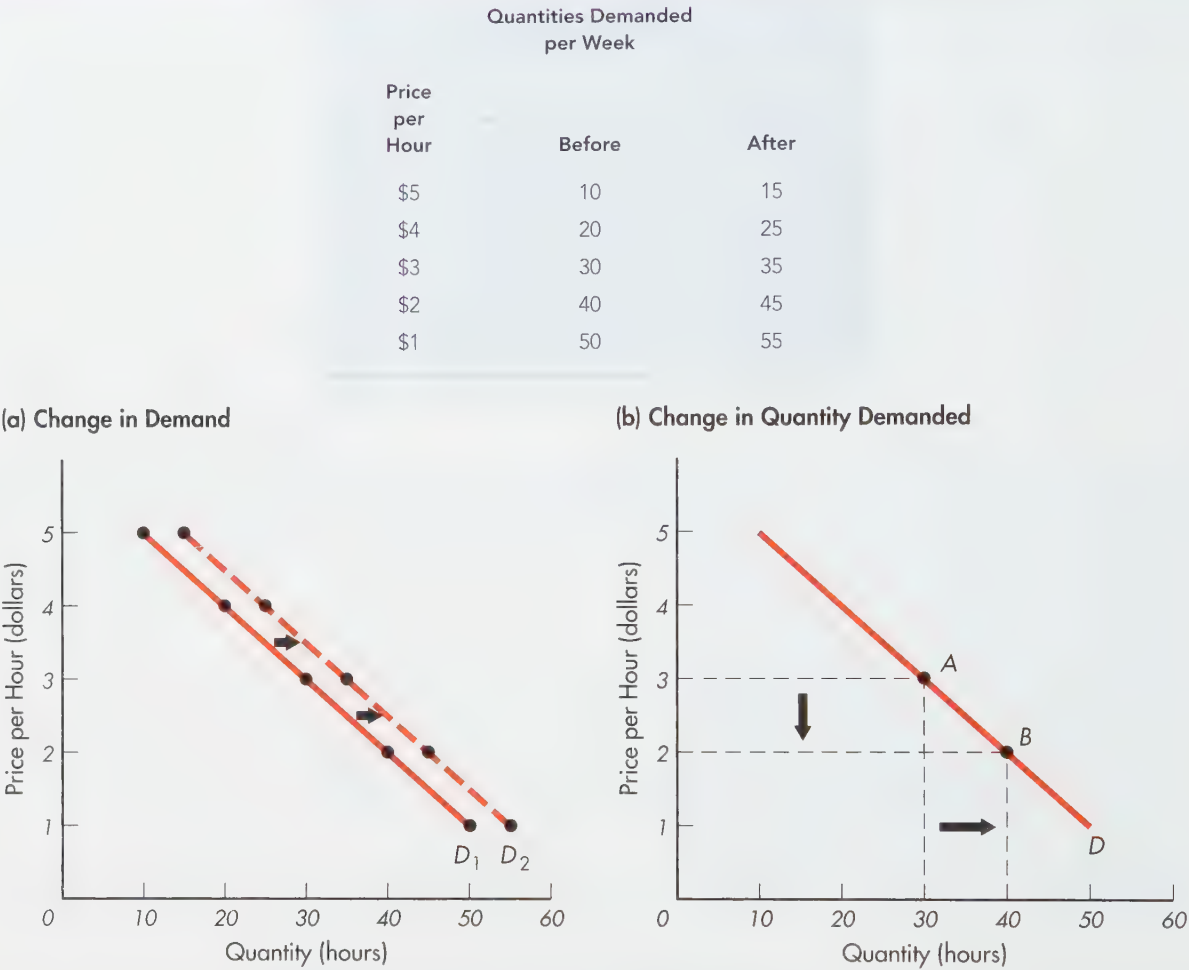
**inferior goods**

Goods for which demand decreases as income increases.

**3.e.2. Tastes** The demand for any good or service depends on individuals' tastes and preferences. When the iPod came out in 2000, it became an instant success. The Sony Walkman lost market share and essentially disappeared. Tastes changed toward the more mobile iPod and, more importantly, toward the more powerful iPod. Thousands of



FIGURE 6 A Change in Demand and a Change in the Quantity Demanded



According to the table, Bob's demand for access time has increased by 5 hours at each price. In Figure 6(a), this change is shown as a shift of the demand curve from  $D_1$  to  $D_2$ . Figure 6(b) shows a change in the quantity demanded. The change in quantity demanded is an increase in the quantity that consumers are willing and able to purchase at a lower price. It is shown as a movement along the demand curve from point A to point B.

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**substitute goods**  
Goods that can be used in place of each other; as the price of one rises, the demand for the other rises.

songs could be stored on an iPod, while the Walkman was constrained by the size of the CD. The iPhone incorporates the iPod into a mobile phone, and it too has been a huge success. Consumers no longer demand the old fixed-line phones but instead want more capabilities in their mobile phones and MP3 devices; their tastes have changed.

**3.e.3. Prices of Related Goods and Services** Goods and services may be related in two ways. **Substitute goods** can be used in place of each other, so that as the cost of one rises, everything else the same, people will buy more of the other. Bread and crackers, BMWs and Acuras, movie downloads and theater movies, universities and community colleges, electricity and natural gas, and time used to access network games and time used for other activities are, more or less, pairs of substitutes. As the price of entertainment venues rises, everything else held constant, the demand for access time for network games will rise; the demand curve for access time will shift to the right.

**Complementary goods** are goods that are used together, and so as the price of one rises, everything else the same, consumers buy less of it but also buy less of the complementary good. Bread and margarine, beer and peanuts, cameras and film, shoes and socks, CDs and CD players, a computer or game board and access to network games, and iPods and iTunes are examples of pairs of complementary goods. As the price of a machine on which to play network games rises, people purchase less access time to those network games. The demand curve for a complementary good shifts to the left when the price of the related good increases.

**3.e.4. Expectations** Expectations about future events can have an effect on demand today. People make purchases today because they expect their income level to be a certain amount in the future, or because they expect the price of certain items to be higher in the future. You might buy running shoes today if you expect the price of those shoes to be higher tomorrow. You might buy your airline ticket home now rather than wait until semester break if you expect the price to be higher next month.

**3.e.5. Number of Buyers** Market demand consists of the sum of the demands of all individuals. The more individuals there are with income to spend, the greater the market demand is likely to be. For example, the populations of Florida and Arizona are much larger during the winter than they are during the summer. The demand for any particular good or service in Arizona and Florida rises (the demand curve shifts to the right) during the winter and falls (the demand curve shifts to the left) during the summer.

## RECAP

1. According to the law of demand, as the price of any good or service rises (falls), the quantity demanded of that good or service falls (rises), during a specific period of time, everything else held constant.
2. A demand schedule is a listing of the quantity demanded at each price.
3. The demand curve is a downward-sloping line plotted using the values in the demand schedule.
4. Market demand is the sum of all individual demands.
5. Demand changes when one of the determinants of demand changes. A demand change is illustrated as a shift of the demand curve.
6. The determinants of demand are income, tastes, prices of related goods and services, expectations, and number of buyers.
7. The quantity demanded changes when the price of the good or service changes. This is a change from one point on the demand curve to another point on the same demand curve.

## 4. Supply

Why do students get discounts at movie theaters? Demand *and* supply. Why do restaurants offer early bird specials? Demand *and* supply. Why is the price of hotel accommodations in Phoenix higher in the winter than in the summer? Demand *and* supply. Why is the price of beef higher in Japan than in the United States? Demand *and* supply. Both demand and supply determine price; neither demand nor supply alone determines price. We just discussed demand; we now discuss supply.

### 4.a. The Law of Supply

Just as demand is the relation between the price and the quantity demanded of a good or service, supply is the relation between the price and the quantity supplied. **Supply** is the amount of the good or service that producers are willing and able to offer for sale at each possible price during a period of time, everything else held constant. **Quantity supplied** is



### 3 What is supply?

#### supply

The amount of a good or service that producers are willing and able to offer for sale at each possible price during a period of time, everything else held constant.

#### quantity supplied

The amount that sellers are willing and able to offer at a given price during a particular period of time, everything else held constant.



law of supply

The quantity of a well-defined good or service that producers are willing and able to offer for sale during a particular period of time increases as the price of the good or service increases and decreases as the price decreases, everything else held constant.

determinants of supply

Factors other than the price of the good that influence supply—prices of resources, technology and productivity, expectations of producers, number of producers, and the prices of related goods and services.

supply schedule

A table or list of prices and the corresponding quantities supplied of a particular good or service.

the amount of the good or service that producers are willing and able to offer for sale at a *specific* price during a period of time, everything else held constant. According to the **law of supply**, as the price of a good or service rises, the quantity supplied rises, and vice versa.

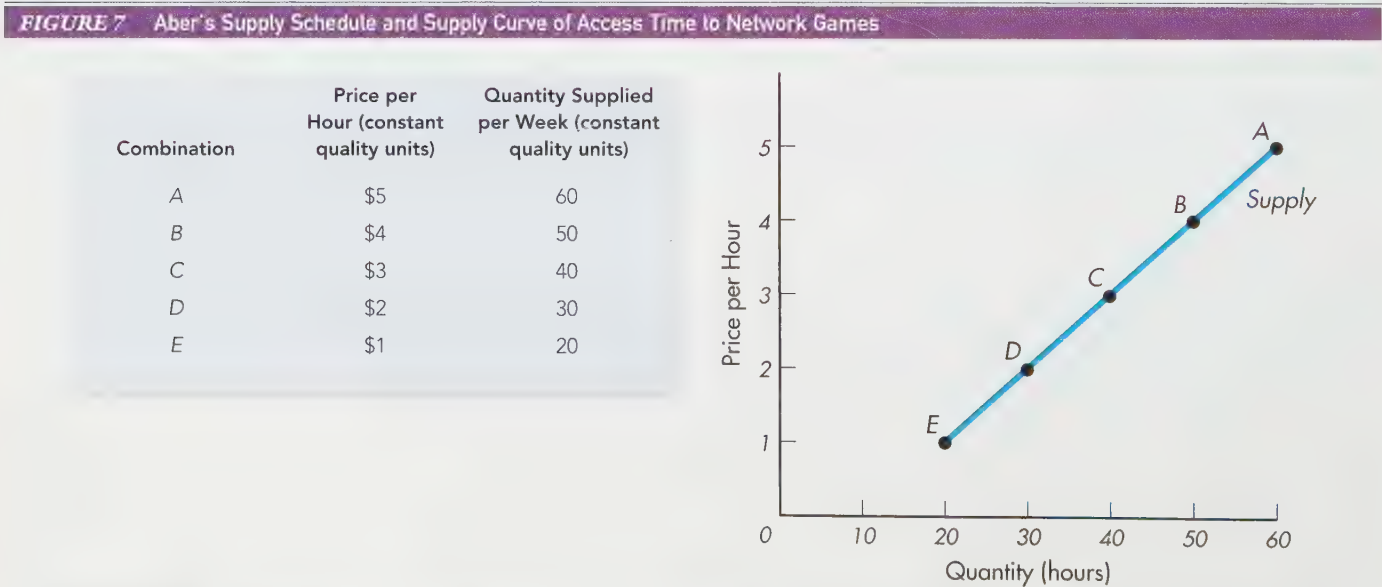
The formal statement of the law of supply consists of five phrases:

- 1. The quantity of a well-defined good or service that
- 2. producers are willing and able to offer for sale
- 3. during a particular period of time
- 4. increases as the price of the good or service increases and decreases as the price decreases,
- 5. everything else held constant.

The first phrase is the same as the first phrase in the law of demand. The second phrase indicates that producers must not only *want* to offer the product for sale but be *able* to offer the product. The third phrase points out that the quantities producers will offer for sale depend on the period of time being considered. The fourth phrase points out that more will be supplied at higher than at lower prices. The final phrase ensures that the **determinants of supply** do not change. The determinants of supply are those factors other than the price of the good or service that influence the willingness and ability of producers to offer their goods and services for sale—the prices of resources used to produce the product, technology and productivity, expectations of producers, the number of producers in the market, and the prices of related goods and services. If any one of these should change, supply changes.

4.b. The Supply Schedule and Supply Curve

A **supply schedule** is a table or list of the prices and the corresponding quantities supplied of a good or service. The table in Figure 7 presents a single firm’s supply schedule for access to network games. (We will assume that three firms offer access to the same network games.) The schedule lists the quantities that each firm is willing and able to supply at each price, everything else held constant. As the price increases, the firm is willing and able to offer more access time to the network games.



The quantity that Aber is willing and able to offer for sale at each price is listed in the supply schedule and shown on the supply curve. At point A, the price is \$5 per hour and the quantity supplied is 60 hours. The combination of \$4 per hour and 50 hours is point B. Each price-quantity combination is plotted, and the points are connected to form the supply curve.

A **supply curve** is a graph of the supply schedule. Figure 7 shows Aber's supply curve of access time to the network games. The price and quantity combinations given in the supply schedule correspond to the points on the curve. For instance, combination *A* in the table corresponds to point *A* on the curve; combination *B* in the table corresponds to point *B* on the curve, and so on for each price-quantity combination.

The supply curve slopes upward. This means that a supplier is willing and able to offer more for sale at higher prices than it is at lower prices. This should make sense—if prices rise, everything else held constant, the supplier will earn more profits. Higher profits create the incentive for the supplier to offer more for sale.

#### 4.c. From Individual Supply Curves to the Market Supply

To derive market supply, the quantities that each producer supplies at each price are added together, just as the quantities demanded by each consumer are added together to get market demand. The table in Figure 8 lists the supply schedules of three firms that sell access to network games: Aber, Broadband, and Courage. The supply schedules are plotted in Figure 8(a). Then in Figure 8(b) the individual supply curves have been added together (in a horizontal direction) to obtain the market supply curve. At a price of \$5, the quantity supplied by Aber is 60, the quantity supplied by Broadband is 30, and the quantity supplied by Courage is 12. This means a total quantity supplied in the market of 102. At a price of \$4, the quantities supplied are 50, 25, and 9, for a total market quantity supplied of 84. The market supply schedule is the last column in the table. The graph of the price and quantity combinations listed in this column is the market supply curve. The market supply curve slopes up because each of the individual supply curves has a positive slope. The market supply curve tells us that the quantity supplied in the market increases as the price rises.

#### supply curve

A graph of a supply schedule that measures price on the vertical axis and quantity supplied on the horizontal axis.

#### 4.d. Changes in Supply and Changes in Quantity Supplied

When we draw the supply curve, we allow only the price and quantity supplied of the good or service that we are discussing to change. Everything else that might affect supply is assumed not to change. If any of the determinants of supply—the prices of resources used to produce the product, technology and productivity, expectations of producers, the number of producers in the market, and the prices of related goods and services—changes, the supply schedule changes and the supply curve shifts.

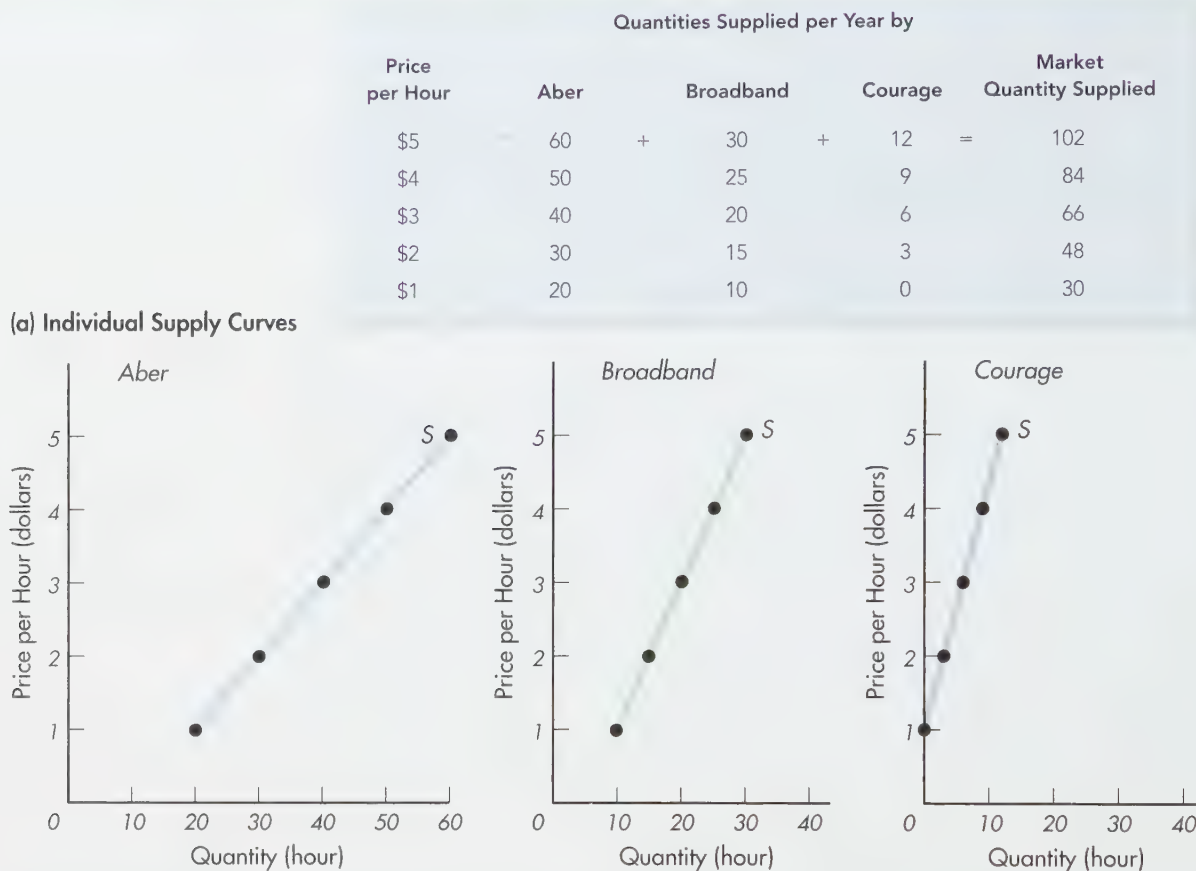
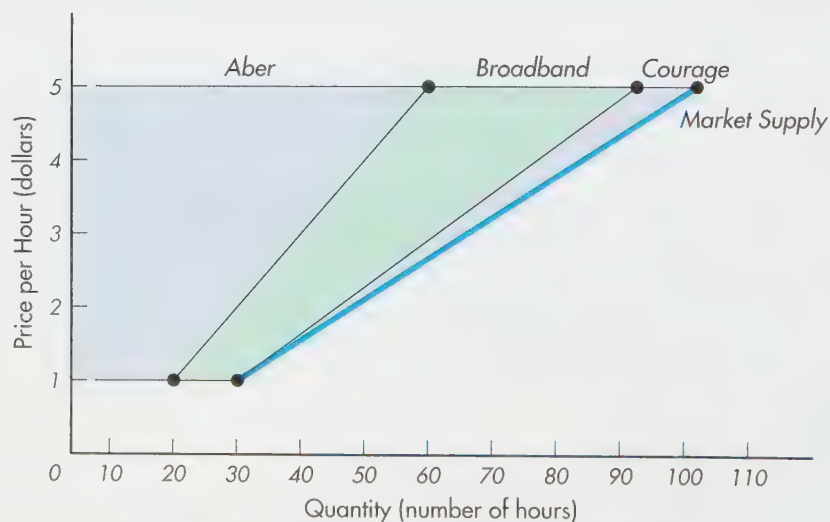
*A change in the quantity supplied is a movement along the supply curve. A change in the supply is a shift of the supply curve.*

**4.d.1. Prices of Resources** If labor costs rise, higher prices will be necessary to induce each store to offer as many hours of access as it did before the cost of the resource rose. The higher cost of resources causes a decrease in supply, meaning a leftward shift of the supply curve, from  $S_1$  to  $S_2$  in Figure 9(a). Compare point *B* on curve  $S_2$  with point *A* on curve  $S_1$ . Both points correspond to a price of \$3, but along curve  $S_1$ , sellers are willing to offer 66 hours of access time, whereas curve  $S_2$  indicates that sellers will offer only 57 hours of access time.

**4.d.2. Technology and Productivity** If resources are used more efficiently in the production of a good or service, more of that good or service can be supplied for the same cost, or the original quantity supplied can be produced for a lower cost. As a result, the supply curve shifts to the right, as in Figure 9(b).

The move from horse-drawn plows to tractors or from mainframe computers to personal computers meant that each worker was able to produce more. The increase in



**FIGURE 8** The Market Supply Schedule and Curve of Access Time to Network Games**(b) Market Supply Curve**

The market supply is derived by summing the quantities that each supplier is willing and able to offer for sale at each price. In this example, there are three producers: The supply schedules of each are listed in the table and plotted as the individual supply curves shown in Figure 8(a). By adding the quantities supplied at each price, we obtain the market supply curve shown in Figure 8(b). For instance, at a price of \$5, Aber offers 60 units, Broadband 30 units, and Courage 12 units, for a market supply quantity of 102. The market supply curve reflects the quantities that each producer is able and willing to supply at each price.

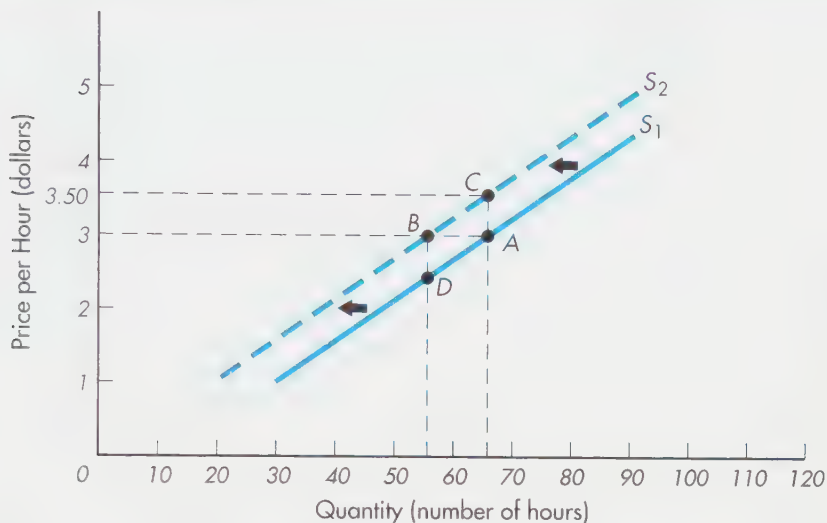
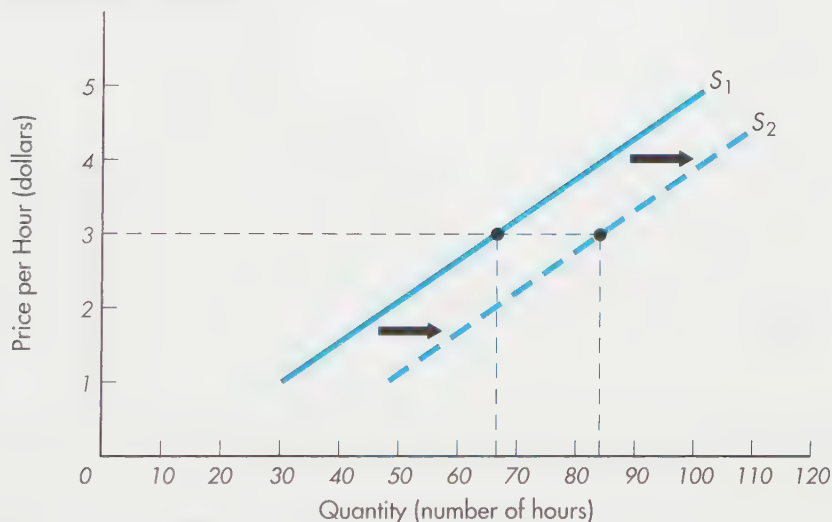
**FIGURE 9** A Shift of the Supply Curve**(a) Decrease in Supply****(b) Increase in Supply**

Figure 9(a) shows a decrease in supply and the shift of the supply curve to the left, from  $S_1$  to  $S_2$ . The decrease is caused by a change in one of the determinants of access time to network games—an increase in the price of labor. Because of the increased price of labor, producers are willing and able to offer fewer access hours at each price than they were before the cost of labor rose. Supply curve  $S_2$  shows that at a price of \$3 per hour of access, suppliers will offer 57 hours. That is 9 hours less than the 66 hours at \$3 per access hour indicated by supply curve  $S_1$ . Conversely, to offer a given quantity, producers must receive a higher price per access hour than they previously were getting: \$3.50 per hour for 66 hours (on supply curve  $S_2$ ) instead of \$3 per hour (on supply curve  $S_1$ ). Figure 9(b) shows an increase in supply. A technological improvement or an increase in productivity causes the supply curve to shift to the right, from  $S_1$  to  $S_2$ . At each price, a higher quantity is offered for sale. At a price of \$3, 66 hours were offered, but with the shift of the supply curve, the quantity of hours for sale at \$3 apiece increases to 84. Conversely, producers can reduce prices for a given quantity—for example, charging \$2 per hour for 66 hours.



**productivity**

The quantity of output produced per unit of resource.

output produced by each unit of a resource is called a *productivity increase*. **Productivity** is defined as the quantity of output produced per unit of resource. Improvements in technology cause productivity increases, which lead to an increase in supply.

**4.d.3. Expectations of Suppliers** Sellers may choose to alter the quantity offered for sale today because of a change in expectations regarding the determinants of supply. A supply curve illustrates the quantities that suppliers are willing and able to supply at every possible price. If suppliers expect that something is going to occur to resource supplies or the cost of resources, then they may alter the quantities that they are willing and able to supply at every possible price. The key point is that the supply curve will shift if producers expect something to occur that will alter their anticipated profits at every possible price, not just a change in one price. For instance, the expectation that demand will decline in the future does not lead to a shift of the supply curve; it leads instead to a decline in quantity supplied, because the new demand curve (the expected lower demand) would intersect the supply curve at a lower price and a smaller output level.

**4.d.4. Number of Suppliers** When more people decide to supply a good or service, the market supply increases. More is offered for sale at each and every price, causing a rightward shift of the supply curve.

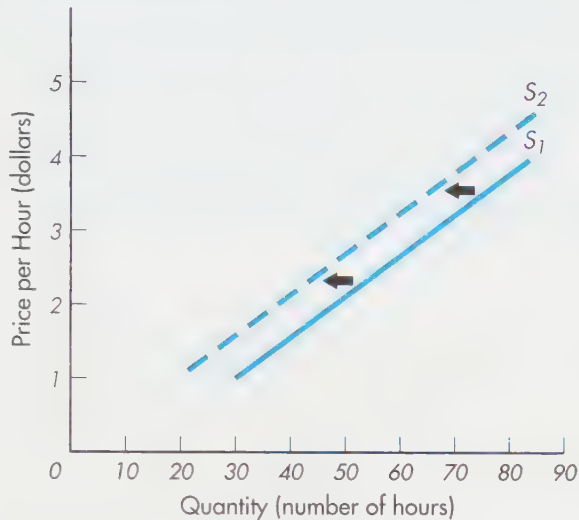
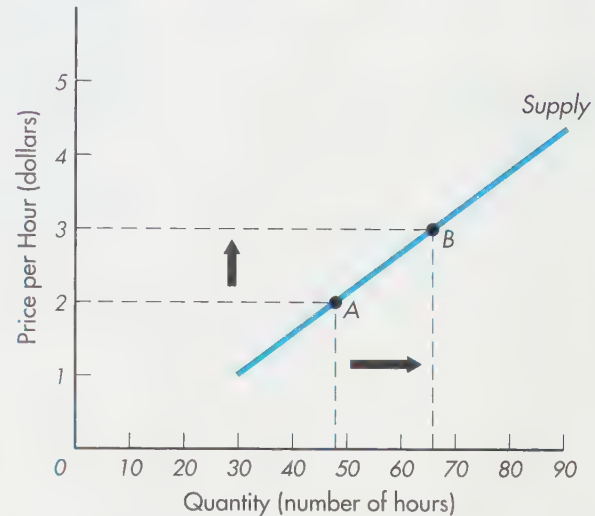
**4.d.5. Prices of Related Goods or Services** The opportunity cost of producing and selling any good or service is the forgone opportunity to produce any other good or service. If the price of an alternative good changes, then the opportunity cost of producing a particular good changes. This could cause the supply curve to change. For instance, if McDonald's can offer hamburgers or salads with equal ease, an increase in the price of salads could lead the manager to offer more salads and fewer hamburgers. The supply curve of salads would shift to the right, and the supply curve of hamburgers would shift to the left.

A *change in supply* occurs when the quantity supplied at each and every price changes or there is a shift in the supply curve—like the shift from  $S_1$  to  $S_2$  in Figure 10(a). A change in one of the determinants of supply brings about a change in supply.

When only the price changes, a greater or smaller quantity is supplied. This is shown as a movement along the supply curve, not as a shift of the curve. A change in price is said to cause a *change in the quantity supplied*. An increase in quantity supplied is shown in the move from point *A* to point *B* on the supply curve of Figure 10(b).

## RECAP

1. According to the law of supply, the quantity supplied of any good or service is directly related to the price of the good or service during a specific period of time, everything else held constant.
2. Market supply is found by adding together the quantities supplied at each price by every producer in the market.
3. Supply changes if the prices of relevant resources change, if technology or productivity changes, if producers' expectations change, if the number of producers changes, or if the prices of related goods and services change.
4. Changes in supply are reflected in shifts of the supply curve. Changes in the quantity supplied are reflected in movements along the supply curve.

**FIGURE 10** A Change in Supply and a Change in the Quantity Supplied**(a) Change in Supply****(b) Change in Quantity Supplied**

In Figure 10(a), the quantities that producers are willing and able to offer for sale at every price decrease, causing a leftward shift of the supply curve from  $S_1$  to  $S_2$ . In Figure 10(b), the quantities that producers are willing and able to offer for sale increase, because of an increase in the price of the good, causing a movement along the supply curve from point A to point B.

## 5. Equilibrium: Putting Demand and Supply Together

The demand curve shows the quantity of a good or service that buyers are willing and able to purchase at each price. The supply curve shows the quantity that producers are willing and able to offer for sale at each price. Only where the two curves intersect is the quantity supplied equal to the quantity demanded. This intersection is the point of **equilibrium**. Equilibrium is a pedagogical device; that is, it is used for teaching or educational purposes. In reality, demand and supply are changing all the time so that the market process is always working; there is not really a static, constant equilibrium price and quantity. Nevertheless, because prices and quantities are always moving toward an equilibrium, the concept is well worth considering. And in our analyses and discussions, we will focus on an equilibrium point in order to illustrate the effects of some change in either demand or supply.



**4** How is price determined by demand and supply?

### equilibrium

The price and quantity at which quantity demanded and quantity supplied are equal.

### 5.a. Determination of Equilibrium

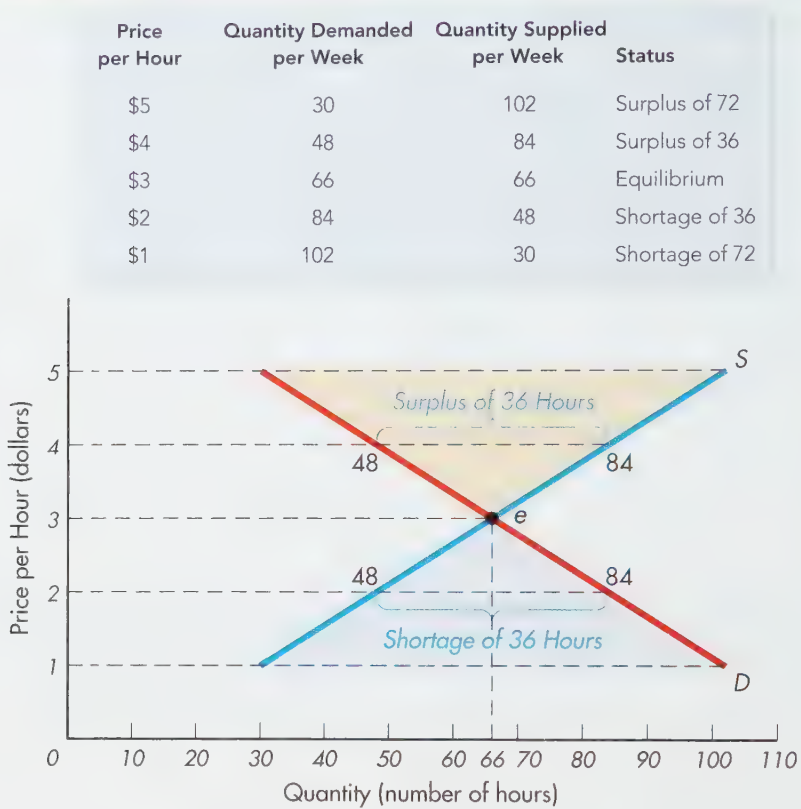
Figure 11 brings together the market demand and market supply curves for access hours to network games. The supply and demand schedules are listed in the table, and the curves are plotted in the graph in Figure 11. Notice that the curves intersect at only one point, labeled  $e$ , a price of \$3 and a quantity of 66. The intersection point is the equilibrium price, the only price at which the quantity demanded and quantity supplied are the same. You can see that at any other price, the quantity demanded and quantity supplied are not the same. This is called **disequilibrium**.

### disequilibrium

Prices at which quantity demanded and quantity supplied are not equal at a particular price.



FIGURE 11   Equilibrium



Equilibrium is established at the point where the quantity that suppliers are willing and able to offer for sale is the same as the quantity that buyers are willing and able to purchase. Here, equilibrium occurs at the price of \$3 per hour and a quantity of 66 hours per week. It is shown as point *e*, at the intersection of the demand and supply curves. At prices above \$3, the quantity supplied is greater than the quantity demanded, and the result is a surplus. At prices below \$3, the quantity supplied is less than the quantity demanded, and the result is a shortage. The area shaded tan shows all prices at which there is a surplus—where quantity supplied is greater than the quantity demanded. The amount of the surplus is measured in a horizontal direction at each price. The area shaded blue represents all prices at which a shortage exists—where the quantity demanded is greater than the quantity supplied. The amount of the shortage is measured in a horizontal direction at each price.

surplus

A quantity supplied that is larger than the quantity demanded at a given price; it occurs whenever the price is greater than the equilibrium price.

shortage

A quantity supplied that is smaller than the quantity demanded at a given price; it occurs whenever the price is less than the equilibrium price.

Whenever the price is greater than the equilibrium price, a **surplus** arises. For example, at \$4, the quantity of hours of access demanded is 48, and the quantity supplied is 84. Thus, at \$4 per hour, there is a surplus of 36 hours—that is, 36 hours supplied are not purchased. Conversely, whenever the price is below the equilibrium price, the quantity demanded is greater than the quantity supplied, and there is a **shortage**. For instance, if the price is \$2 per hour of access, consumers will want and be able to pay for more hours of access than are available. As shown in the table in Figure 11, the quantity demanded at a price of \$2 is 84, but the quantity supplied is only 48. There is a shortage of 36 hours of access at the price of \$2.

Neither a surplus nor a shortage will exist for long if the price of the product is free to change. Suppliers who are stuck with hours of access not being purchased will lower the price and reduce the quantities they are offering for sale in order to eliminate a

surplus. Conversely, suppliers who cannot supply enough hours to meet demand and who have consumers on hold or losing connection will raise the price to eliminate a shortage. Surpluses lead to decreases in the price and the quantity supplied and increases in the quantity demanded. Shortages lead to increases in the price and the quantity supplied and decreases in the quantity demanded.

A shortage exists only when the quantity that people are willing and able to purchase at a particular price is more than the quantity supplied *at that price*. Scarcity occurs when more is wanted at a zero price than is available.

*Note that a shortage is not the same thing as scarcity.*

## 5.b. Changes in the Equilibrium Price: Demand Shifts

Equilibrium is the combination of price and quantity at which the quantities demanded and supplied are the same. Once an equilibrium is achieved, there is no incentive for suppliers or consumers to move away from it. An equilibrium price changes only when demand and/or supply changes—that is, when the determinants of demand or the determinants of supply change.

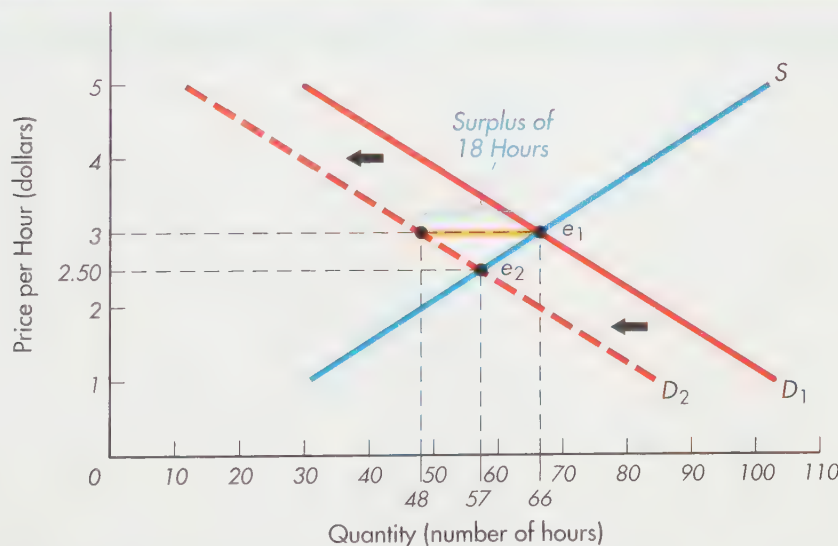
Let's consider a change in demand and what it means for the equilibrium price. Suppose that experiments on rats show that playing network games causes brain damage. As a result, a large segment of the human population decides not to purchase access time to the games. Suppliers experience a decrease in the number of customers willing and able to pay for access, as shown in Figure 12 by a leftward shift of the demand curve, from curve  $D_1$  to curve  $D_2$ .

Once the demand curve has shifted, the original equilibrium price of \$3 per hour of access per week at point  $e_1$  is no longer equilibrium. At a price of \$3, the quantity supplied is still 66, but the quantity demanded has declined to 48 (look at the demand curve  $D_2$  at a price of \$3). There is, therefore, a surplus of 18 hours of access time per week at the price of \$3.



**5** What causes price to change?

**FIGURE 12** The Effects of a Shift of the Demand Curve



The initial equilibrium price (\$3 per hour of access time) and quantity (66 hours of access time) are established at point  $e_1$ , where the initial demand and supply curves intersect. A change in the tastes for access hours to the network games causes demand to decrease, and the demand curve shifts to the left. At \$3 per hour of access, the initial quantity supplied, 66 hours, is now greater than the quantity demanded, 48 hours. The surplus of 18 hours causes suppliers to reduce the amount of hours of access offered and to lower the price. The market reaches a new equilibrium, at point  $e_2$ , \$2.50 per hour and 57 hours per week.



With a surplus comes downward pressure on the price. This downward pressure occurs because producers acquire fewer hours of access for purchase and reduce the price in an attempt to sell those hours not being used. Suppliers continue reducing the price and the quantity available until consumers purchase all the hours that the sellers have available, or until a new equilibrium is established. That new equilibrium occurs at point  $e_2$  with a price of \$2.50 and a quantity of 57.

The decrease in demand is represented by the leftward shift of the demand curve. A decrease in demand results in a lower equilibrium price and a lower equilibrium quantity as long as there is no change in supply. Conversely, an increase in demand would be represented as a rightward shift of the demand curve and would result in a higher equilibrium price and a higher equilibrium quantity as long as there is no change in supply.

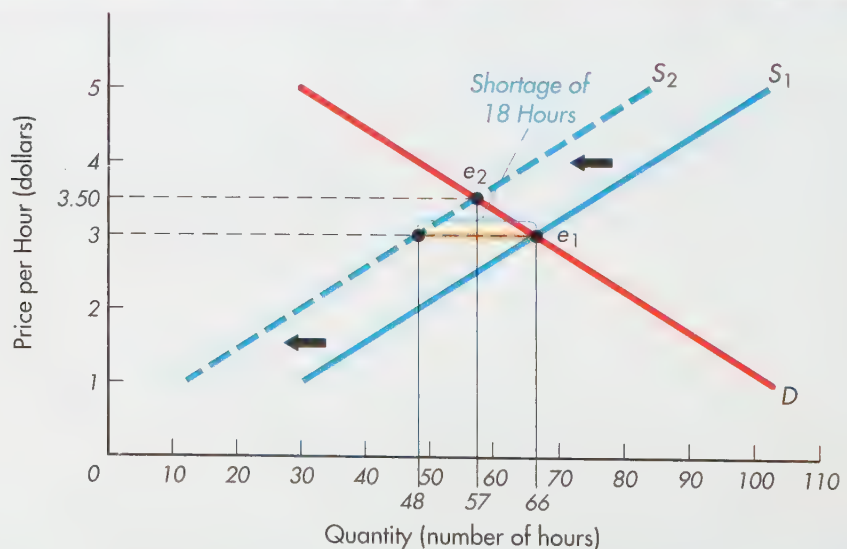
### 5.c. Changes in the Equilibrium Price: Supply Shifts

The equilibrium price and quantity may be altered by a change in supply as well. If the price of relevant resources, technology and productivity, the expectations of suppliers, the number of suppliers, or the prices of related products change, supply changes.

Let's consider an example. Suppose a tax is imposed on all Internet access and that this tax increases the cost for the network game suppliers to provide access time. This is represented by a leftward shift of the supply curve in Figure 13.

The leftward shift of the supply curve, from curve  $S_1$  to curve  $S_2$ , leads to a new equilibrium price and quantity. At the original equilibrium price of \$3 at point  $e_1$ , 66 hours of access are supplied. After the shift in the supply curve, 48 hours are supplied at a price of \$3 per hour, and there is a shortage of 18 hours per week. The shortage puts upward pressure on price. As the price rises, consumers decrease the quantities that they are willing and able to purchase, and suppliers increase the quantities that they are willing and able to supply. Eventually, a new equilibrium price and quantity is established at \$3.50 and 57 hours of access each week at point  $e_2$ .

**FIGURE 13** The Effects of a Shift of the Supply Curve



The initial equilibrium price and quantity are \$3 and 66 hours, at point  $e_1$ . When the Internet tax is imposed, suppliers' costs have risen, and so they are willing and able to offer fewer hours for sale at each price. The result is a leftward (upward) shift of the supply curve, from  $S_1$  to  $S_2$ . At the old price of \$3, the quantity demanded is still 66, but the quantity supplied falls to 48. The shortage is 18 hours of access time. The shortage leads to a new equilibrium,  $e_2$ , the intersection between curves  $S_2$  and  $D$ , which is \$3.50 per hour of access time and 57 hours of access time.

The decrease in supply is represented by the leftward shift of the supply curve. A decrease in supply with no change in demand results in a higher price and a lower quantity. Conversely, an increase in supply would be represented as a rightward shift of the supply curve. An increase in supply with no change in demand would result in a lower price and a higher quantity.

## 5.d. Market Adjustment and Market Interference

We have examined a hypothetical (imaginary) market for access time to network games in order to represent what goes on in real markets. We have established that the price of a good or service is defined by an equilibrium between demand and supply. We noted that an equilibrium could be disturbed by a change in demand, a change in supply, or simultaneous changes in demand and supply. The important point of this discussion is to demonstrate that when they are not in equilibrium, the price and the quantities demanded and/or supplied change and move toward an equilibrium. The market is always attempting to reach equilibrium.

Looking at last year's sweaters piled up on the sale racks, waiting over an hour for a table at a restaurant, or hearing that 5 or 6 percent of people who are willing and able to work are unemployed may make you wonder whether equilibrium is ever established. In fact, it is not uncommon to observe situations in which quantities demanded and quantities supplied are not equal. But this observation does not cast doubt on the usefulness of the equilibrium concept. Even if not all markets clear, or reach equilibrium, all the time, we can be reasonably assured that market forces are operating so that the market is moving toward an equilibrium. When you see the store having a sale, you know that the market is moving toward equilibrium. When you hear that the price of something is rising because so many people are buying it, you know that the market is moving toward equilibrium. Sometimes the market is not allowed to move toward equilibrium, as discussed in the following section.

**5.d.1. Market Interference: Price Ceilings and Price Floors** A **price floor** is a situation in which the price is not allowed to decrease below a certain level. Consider Figure 14, representing the market for sugar. The equilibrium price of sugar is \$.10 a pound, but because the government has set a price floor of \$.20 a pound, as shown by the solid yellow line, the price is not allowed to move to its equilibrium level. A surplus of 250,000 pounds of sugar results from the price floor. Sugar growers produce 1 million pounds of sugar, and consumers purchase 750,000 pounds of sugar.

We saw previously that whenever the price is above the equilibrium price, a surplus arises and begins to force the price to decline. The price floor interferes with the functioning of the market; a surplus exists because the government will not allow the price to drop. The sugar surplus builds up as each week more sugar is produced than is consumed.

What would occur if the government had set the price floor at \$.09 a pound? Since at \$.09 a pound a shortage of sugar would result, the price would rise. A price floor keeps the price only from falling, not from rising. So the price rises to its equilibrium level of \$.10. Only if the price floor is set above the equilibrium price is it an effective price floor.

A **price ceiling** is the situation in which a price is not allowed to rise to its equilibrium level. Los Angeles, San Francisco, and New York are among more than 125 U.S. cities that have some type of *rent controls*. The New York City rent control law places a ceiling on the rents that landlords can charge for apartments. Figure 15 is a demand and supply graph representing the market for apartments in New York. The equilibrium price is \$3,000 a month. The government has set a price of \$1,500 a month as the maximum that can be charged. The price ceiling is shown by the solid yellow line. At the rent control price of \$1,500 per month, 3,000 apartments are available, but consumers want 6,000 apartments. There is a shortage of 3,000 apartments.



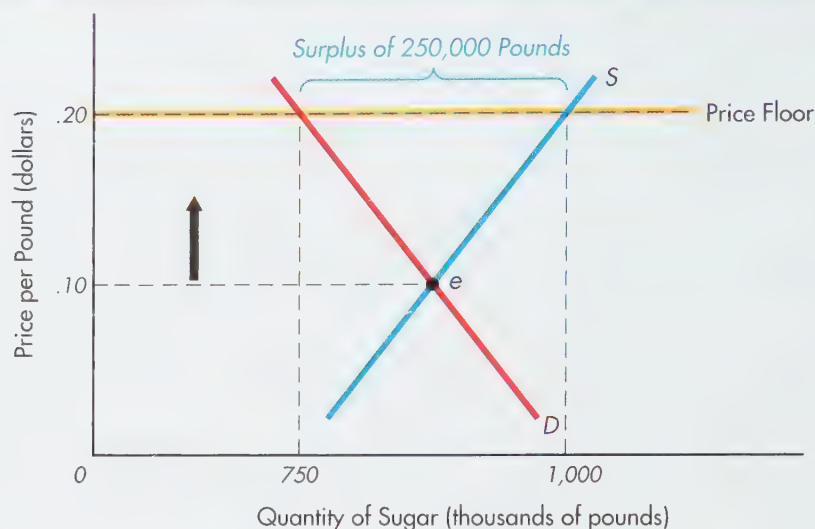
**6** What happens when price is not allowed to change with market forces?

### price floor

A situation in which the price is not allowed to decrease below a certain level.

### price ceiling

A situation in which the price is not allowed to rise above a certain level.

**FIGURE 14** A Price Floor

The equilibrium price of sugar is \$.10 a pound, but because the government has set a price floor of \$.20 a pound, as shown by the solid yellow line, the price is not allowed to move to its equilibrium level. A surplus of 250,000 pounds of sugar results from the price floor. Sugar growers produce 1 million pounds of sugar, and consumers purchase 750,000 pounds of sugar.

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**FIGURE 15** Rent Controls

A demand and supply graph representing the market for apartments in New York City is shown. The equilibrium price is \$3,000 a month. The government has set a price of \$1,500 a month. The government's price ceiling is shown by the solid yellow line. At the government's price, 3,000 apartments are available but consumers want 6,000. There is a shortage of 3,000 apartments.

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The shortage means that not everyone who is willing and able to rent an apartment will be able to. Since the price is not allowed to ration the apartments, something else will have to. It may be that those who are willing and able to stand in line the longest get the apartments. Perhaps bribing an important official might be the way to get an apartment. Perhaps relatives of officials or important citizens will get the apartments. Whenever a price ceiling exists, a shortage results, and some rationing device other than price will arise.

Had the government set the rent control price at \$4,000 per month, the price ceiling would not have had an effect. Since the equilibrium is \$3,000 a month, the price would not have risen to \$4,000. Only if the price ceiling is below the equilibrium price will it be an effective price ceiling.

Price ceilings are not uncommon in the United States or in other economies. China had a severe housing shortage for 30 years because the price of housing was kept below equilibrium. Faced with unhappy citizens and realizing the cause of the shortage, officials began to lift the restrictions on housing prices in 1985. The shortage has diminished. In the former Soviet Union, prices for all goods and services were defined by the government. For most consumer items, the price was set below equilibrium, and shortages existed. The long lines of people waiting to purchase food or clothing were the result of the price ceilings on all goods and services. In the United States, price ceilings on all goods and services have been imposed at times. During World War I and World War II, and during the Nixon administration of the early 1970s, wage and price controls were imposed. These were price ceilings on all goods and services. As a result of the ceilings, people were unable to purchase many of the products they desired. The Organization of Petroleum Exporting Countries (OPEC) restricted the quantity of oil in the early 1970s and drove its price up considerably. The U.S. government responded by placing a price ceiling on gasoline. The result was long lines at gas stations because of shortages of gasoline.

Price floors are quite common in economies as well. The agricultural policies of most of the developed nations are founded on price floors—the government guarantees that the price of an agricultural product will not fall below some level. Price floors result in surpluses, and this has been the case with agricultural products as well. The surpluses in agricultural products in the United States have resulted in cases where dairy farmers have dumped milk in rivers, where grain was given to other nations at taxpayer expense, and where citrus ranchers have picked and then discarded thousands of tons of citrus, all to reduce huge surpluses.

When price ceilings or price floors do not allow a market to reach equilibrium, shortages or surpluses will result. Since the price is not allowed to allocate the goods or services, another allocation mechanism will—first-come, first-served; government; or lottery.

### 5.e. Market Adjustment: Watch the Price of Eggs

During the 1990s, country after country turned from government-run economies to market economies. In Latin America, in Eastern Europe and Russia, in China, and in India, former socialist or dictatorial nations sought to free their stagnant and collapsing economies from government control. In these countries, government price controls were lifted, and people were allowed to buy and sell what they wanted. The leaders of the reforms were often told by their economic advisers, “Watch the price of eggs. If the price rises and more eggs are offered for sale, and then the price falls, it is a sign that markets are working.”

So, when the price control was lifted, prices shot upward, frightening both the leaders and the individual people. But, within hours of the lifting of price controls, markets arose in which eggs, other produce, and some clothing items appeared. Shortages disappeared. Why? What was occurring?

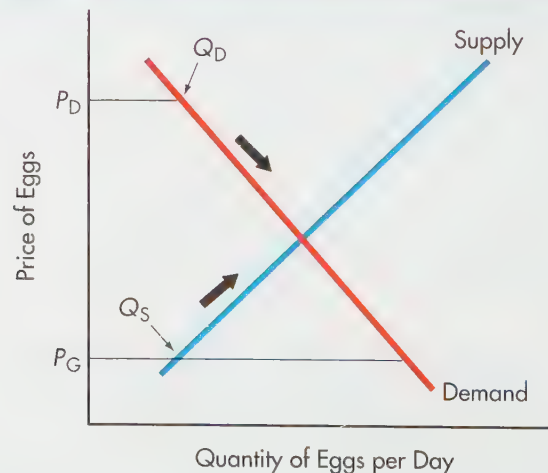
Why did the advisers focus on eggs and not the heavy industries like shipbuilding, oil refining, or power generation? They focused on eggs because the market for eggs would be the quickest to emerge. Once they were free to do so, local farmers would bring their eggs to the city to sell; it doesn't take long to produce eggs. As the price of eggs rose, more eggs would be brought to market. Items such as ships, airplanes, tractors, and so forth would not increase in supply nearly as rapidly as would eggs; it would take years for these items to be produced.

The market for eggs is depicted in Figure 16. The government-controlled price is  $P_G$ . The price ceiling meant shortages, as the quantity demanded is larger than the quantity supplied. When the price ceiling is lifted, the price immediately shoots up to  $P_D$ , but the quantity supplied does not change. Eventually, the high price leads to increasing quantities of eggs being supplied. Quite rapidly, in the case of eggs, the price drops to the equilibrium.

The adjustment process took much more time in the heavy industries. Once the price controls on items like gasoline, electricity, or industrial products were lifted, the price shot up, but the quantities supplied could not increase for quite some time. As a result, prices remained very high for months or years, until suppliers could begin offering more gasoline, electricity, ships, airplanes, and tractors. To the citizens, it seemed as if the markets were not working because the higher price did not bring forth increased quantities supplied.

Years, not days, were necessary for a complete transition from government-run to market-based economies in those countries where heavy industry was a large part of the economy, such as Poland.<sup>2</sup> In Russia, the transition to a market economy has not fully occurred. In countries that were primarily agricultural, such as China, the transition has occurred more rapidly.

**FIGURE 16** Ending Price Controls



The controlled price is at  $P_G$ . When price controls are lifted, price immediately shoots up to  $P_D$  because the quantity supplied does not immediately change. Eventually, the quantity that is supplied rises, and as it rises, the price is driven to the equilibrium level.

<sup>2</sup> The video *Commanding Heights*, based on the book of the same name by Daniel Yergin and Joseph Stanislaus, provides a vivid portrayal of the transition from government to market economies during the 1990s.

## RECAP

1. Equilibrium occurs when the quantity demanded and the quantity supplied are equal: It is the price-quantity combination where the demand and supply curves intersect.
2. A price that is above the equilibrium price creates a surplus. Producers are willing and able to offer more for sale than buyers are willing and able to purchase.
3. A price that is below the equilibrium price leads to a shortage, because buyers are willing and able to purchase more than producers are willing and able to offer for sale.
4. When demand changes, price and quantity change in the same direction—both rise as demand increases, and both fall as demand decreases.
5. When supply changes, price and quantity change, but not in the same direction. When supply increases, price falls and quantity rises. When supply decreases, price rises and quantity falls.
6. When both demand and supply change, the direction of the change in price and quantity depends on the relative sizes of the changes of demand and supply.
7. A price floor is a situation in which a price is set above the equilibrium price. This creates a surplus.
8. A price ceiling is a case in which a price is set below the equilibrium price. This creates a shortage.
9. When a price ceiling is lifted, the market will adjust. The speed of adjustment of the quantity supplied and prices depends on how rapidly resources can be altered, goods and services produced, and supplies brought to market.

## SUMMARY

### 1. How do we decide who gets the scarce goods and resources?

- An allocation system is a way to determine who gets the scarce goods and resources. Allocation schemes include lottery; government; market; and first-come, first-served. §1
- The advantage of a market system over other allocation schemes is the incentive created by the market system. §1.b

### 2. What is demand?

- Demand is the quantities that buyers are willing and able to buy at alternative prices. §3
- The quantity demanded is a specific amount at one price. §3
- The law of demand states that as the price of a well-defined commodity rises (falls), the quantity demanded during a given period of time will fall (rise), everything else held constant. §3.a
- Demand will change when one of the determinants of demand changes, that is, when income,

tastes, prices of related goods and services, expectations, or number of buyers changes. A demand change is illustrated as a shift of the demand curve. §3.e

### 3. What is supply?

- Supply is the quantities that sellers will offer for sale at alternative prices. §4.a
- The quantity supplied is the amount that sellers offer for sale at one price. §4.a
- The law of supply states that as the price of a well-defined commodity rises (falls), the quantity supplied during a given period of time will rise (fall), everything else held constant. §4.a
- Supply changes when one of the determinants of supply changes, that is, when prices of resources, technology and productivity, expectations of producers, the number of producers, or the prices of related goods or services change. A supply change is illustrated as a shift of the supply curve. §4.d



4. How is price determined by demand and supply?
  - Together, demand and supply determine the equilibrium price and quantity. §5
5. What causes price to change?
  - A price that is above equilibrium creates a surplus, which leads to a lower price. A price that is below equilibrium creates a shortage, which leads to a higher price. §5.a
  - A change in demand or a change in supply (a shift of either curve) will cause the equilibrium price and quantity to change. §5.b, 5.c
6. What happens when price is not allowed to change with market forces?
  - Markets are not always in equilibrium, but when not, surpluses or shortages arise and force the price to move them toward equilibrium. §5.d
  - A price floor is a situation in which a price is not allowed to decrease below a certain level—it is set above the equilibrium price. This creates a surplus. A price ceiling is a case in which a price is not allowed to rise—it is set below the equilibrium price. This creates a shortage. §5.d

## KEY TERMS

|                                 |                    |                       |
|---------------------------------|--------------------|-----------------------|
| barter, 44                      | equilibrium, 57    | quantity demanded, 44 |
| complementary goods, 51         | inferior goods, 49 | quantity supplied, 51 |
| demand, 44                      | law of demand, 44  | shortage, 58          |
| demand curve, 46                | law of supply, 52  | substitute goods, 50  |
| demand schedule, 45             | market, 38         | supply, 51            |
| determinants of demand, 45      | normal goods, 49   | supply curve, 53      |
| determinants of supply, 52      | price ceiling, 61  | supply schedule, 52   |
| disequilibrium, 57              | price floor, 61    | surplus, 58           |
| double coincidence of wants, 44 | productivity, 56   |                       |

## EXERCISES

1. Illustrate each of the following events using a demand and supply diagram for bananas.
  - a. Reports surface that imported bananas are infected with a deadly virus.
  - b. Consumers' incomes drop.
  - c. The price of bananas rises.
  - d. The price of oranges falls.
  - e. Consumers expect the price of bananas to decrease in the future.
2. Answer true or false, and if the statement is false, change it to make it true. Illustrate your answers on a demand and supply graph.
  - a. An increase in demand is represented by a movement up the demand curve.
  - b. An increase in supply is represented by a movement up the supply curve.
  - c. An increase in demand without any changes in supply will cause the price to rise.
  - d. An increase in supply without any changes in demand will cause the price to rise.
3. Using the following schedule, define the equilibrium price and quantity. Describe the situation at a price of \$10. What will occur? Describe the situation at a price of \$2. What will occur?
 

| Price | Quantity Demanded | Quantity Supplied |
|-------|-------------------|-------------------|
| \$1   | 500               | 100               |
| \$2   | 400               | 120               |
| \$3   | 350               | 150               |
| \$4   | 320               | 200               |
| \$5   | 300               | 300               |
| \$6   | 275               | 410               |
| \$7   | 260               | 500               |
| \$8   | 230               | 650               |
| \$9   | 200               | 800               |
| \$10  | 150               | 975               |
4. Suppose the government imposed a minimum price of \$7 in the schedule of exercise 3. What would occur? Illustrate.

5. In exercise 3, indicate what the price would have to be to represent an effective price ceiling. Point out the surplus or shortage that results. Illustrate a price floor and provide an example of a price floor.
6. A common feature of skiing is waiting in lift lines. Does the existence of lift lines mean that the price is not working to allocate the scarce resource? If so, what should be done about it?
7. Why don't we observe barter systems as often as we observe the use of currency?
8. A severe drought in California has resulted in a nearly 30 percent reduction in the quantity of citrus grown and produced in California. Explain what effect this event might have on the Florida citrus market.
9. The prices of the Ralph Lauren Polo line of clothing are considerably higher than those of comparable-quality lines. Yet this line sells more than a J. C. Penney brand line of clothing. Does this violate the law of demand?
10. In December, the price of Christmas trees rises and the quantity of trees sold rises. Is this a violation of the law of demand?
11. In recent years, the price of artificial Christmas trees has fallen while the quality has risen. What impact has this event had on the price of cut Christmas trees?
12. Many restaurants don't take reservations. You simply arrive and wait your turn. If you arrive at 7:30 in the evening, you have at least an hour wait. Notwithstanding that fact, a few people arrive, speak quietly with the maitre d', hand him some money, and are promptly seated. At some restaurants that do take reservations, there is a month wait for a Saturday evening, three weeks for a Friday evening, two weeks for Tuesday through Thursday, and virtually no wait for Sunday or Monday evening. How do you explain these events using demand and supply?
13. Evaluate the following statement: "The demand for U.S. oranges has increased because the quantity of U.S. oranges demanded in Japan has risen."
14. In December 1992, the federal government began requiring that all foods display information about fat content and other ingredients on food packages. The displays had to be verified by independent laboratories. The price of an evaluation of a food product could run as much as \$20,000. What impact do you think this law had on the market for meat?
15. Draw a PPC. Which combination shown by the PPC will be produced? How is this combination determined? Does the combination that is produced depend on how goods and services are allocated?
16. The price of oil increased to more than \$100 per barrel following the turmoil in the Mideast in 2011. Illustrate, using a market for oil, why the price rose.
17. Using exercise 16, illustrate what would have occurred had a price ceiling on oil of \$80 per barrel existed.

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

## THE WRONG ANSWER FOR HIGH GAS PRICES

*The Baltimore Sun*, September 8, 2005

**W**ashington—When Rudyard Kipling said it was a great virtue “if you can keep your head when all about you are losing theirs and blaming it on you,” he was not thinking of Sen. Maria Cantwell, a Democrat from Washington. This week, as gasoline prices remained above \$3 a gallon, she proposed giving the president the power to tell retailers what they can charge at the pump.

A lot of people grew anxious seeing long lines forming the week before last, as motorists rushed to fill their tanks in the aftermath of Hurricane Katrina. But Ms. Cantwell apparently enjoyed the sight well enough that she'd like to make those lines a permanent feature of the landscape. If so, she has the right approach. The government does many things badly, but one thing it knows how to do is create shortages through the vigorous use of price controls.

That's what it did in the oil market in 1979–80, under President Jimmy Carter. He was replaced by Ronald Reagan, who lifted price caps on gas and thus not only banished shortages but brought about an era of low prices.

Ms. Cantwell thinks oil companies have manipulated the energy market to gouge consumers, though she is awaiting evidence to support that theory. “I just don't have the document to prove it,” she declared. Her suspicions were roused when she noticed that prices climbed in Seattle—though most of its oil comes from Alaska, which was not hit by a hurricane.

Maybe no one has told Ms. Cantwell that oil trades in an international market, and that when companies and consumers in the South can't get fuel from their usual sources, they will buy it from other ones, even if they have to go as far as Prudhoe Bay.

If prices rose in Dallas and didn't rise in Seattle, oil producers would have a big incentive to ship all their supplies to Texas—leaving Washingtonians to pay nothing for nothing. When a freeze damages Florida's orange juice crop, does Ms. Cantwell think only Floridians feel the pain?

Sen. Byron Dorgan, a Democrat from North Dakota, meanwhile, was outraged by the thought of giant oil companies making money merely for supplying the nation's energy needs. He claimed they will reap \$80 billion in “windfall profits” and wants the government to confiscate a large share of that sum through a special federal tax.

But the prospect of occasional “windfall” profits is one reason corporations are willing to risk their money drilling wells that may turn out to be drier than Alan Greenspan's reading list. Take them away, and investors may decide they'd rather speculate in real estate.

It's hard to see why oil companies shouldn't make a lot of money when the commodity they provide is suddenly in short supply. After all, they are vulnerable to weak profits or even losses during times of glut. Back when Americans were enjoying abundant cheap gasoline, the joke was that the surest way to

make a small fortune in the oil industry was to start with a large fortune.

Oil companies are also subject to the whims of nature. No one is holding a charity fundraiser for the business people whose rigs and refineries were smashed by Katrina. No one will come to their aid if prices drop by half.

Besides, high prices serve two essential functions: encouraging production and fostering conservation. Spurred by the lure of windfall profits, oil companies will move heaven and earth to get more gasoline to consumers. Shocked by the tab when they fill up a 5,600-pound SUV, motorists will look for opportunities to leave the Suburban at home. They may even commit a sin not covered by the Ten Commandments: Coveting their neighbor's Prius.

Controlling prices, by contrast, would have exactly the opposite effect: telling consumers they should waste fuel to their hearts' content and telling producers to leave the black stuff in the ground. When events in the world conspire to make oil dear, there is nothing to be gained from masking that fact. We can ignore reality, but reality won't ignore us.

STEVE CHAPMAN

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**D**ictating the retail price that companies can sell gasoline at is nothing more than a price ceiling. In the figure below left, the ceiling price of  $P_m$  is less than the equilibrium price  $P_1$ . This price ceiling creates a shortage: At the controlled price  $P_m$ , the quantity of gasoline demanded is  $Q_d$ , while the quantity supplied is only  $Q_s$ . The difference,  $Q_d - Q_s$ , is the quantity of gasoline that consumers would be willing and able to buy but can't because there is none available. What does a shortage in gasoline look like? It is long lines at gas pumps. It is people stranded because they have run out of gas.

How is this shortage resolved? Since price cannot be used to resolve the shortage, something else will. Common replacements for price are first-come, first-served and corruption.

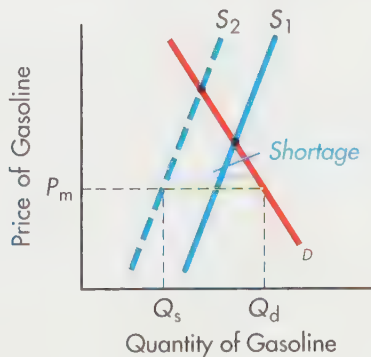
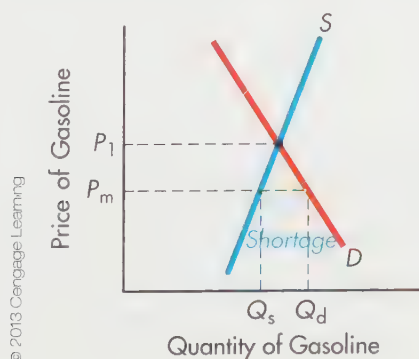
First-come, first-served is what we typically see. Long lines form at gas stations. People "top off" their tanks, driving into a station whenever they see an opening in order to keep their gas tanks full. One result is many more people at pumps than would otherwise be the case. Another is that some gas stations close because they can't obtain supplies.

Crude oil, the main source of gasoline, is traded in a global market. If prices rise in one part of the world but are not allowed to rise in others, the crude oil will be shipped to where its return is highest. As the article notes, "If prices rose in Dallas and didn't rise in Seattle, oil producers would have a big incentive to ship all their supplies to Texas—leaving Washingtonians to pay nothing for nothing. When a freeze damages Florida's orange juice crop, does Ms. Cantwell think only Floridians feel the pain?" If the United States limited gasoline prices to

\$2 per gallon and other parts of the world allowed the price to rise to \$4 per gallon, the oil would be shipped to where it could be refined and a profit made from selling gasoline. In short, price ceilings lead to shortages. Even if the oil was not shipped around the world, why would anyone invest millions of dollars in drilling for oil when they would not make a profit? As the commentary notes, controlling prices tells producers to leave the black stuff in the ground. Refineries would be shut down, and no new spending on oil wells and facilities would occur. Over time, the supply of gasoline would decline even further, shown as the move from  $S_1$  to  $S_2$  in the figure below on the right. This would create larger shortages.

In the Soviet Union, China, Cuba, India, and other nations that imposed price controls on many goods and services for a long period of time, first-come, first-served allocation was replaced with graft and corruption. If you bribed the right official, you could get some bread or milk. If you paid off the manager, you could find other items that you needed. Corruption leads to a collapse of civilization—standards of living decline.

As noted in the chapter, allocation schemes other than price do not create incentives for improvement or increases in standards of living. What incentive does the first-come, first served system create? Just to be first. All you do is stand in lines. Nothing more is produced, and no alternatives to gasoline are ever discovered. In contrast, if price is not controlled, it rises to equilibrium, the quantity supplied rises, and the quantity demanded falls. The higher price brings out entrepreneurs seeking profits. These entrepreneurs will discover more efficient ways to transport people and alternative energy sources to oil and gasoline.



# The Market System and the Private and Public Sectors



### FUNDAMENTAL QUESTIONS

- 1 In a market system, who decides what goods and services are produced and how they are produced, and who obtains the goods and services that are produced?
- 2 What is a household, and what is household income and spending?
- 3 What is a business firm, and what is business spending?
- 4 How does the international sector affect the economy?
- 5 What is the public sector? What is public sector spending?
- 6 How do the private and public sectors interact?



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**Y**ou decide to buy a new Toyota, so you go to a Toyota dealer and exchange money for the car. The Toyota dealer has rented land and buildings and hired workers in order to make cars available to you and other members of the public. The employees earn incomes paid by the Toyota dealer and then use those incomes to buy food from the grocery store. This transaction generates revenue for the grocery store, which hires workers and pays them incomes that they then use to buy groceries and Toyotas.

The story is complicated by the fact that your Toyota may have been manufactured in Japan and then shipped to the United States before it was sold by the local Toyota dealer. Your purchase of the Toyota creates revenue for both the local dealer and the manufacturer, which pays autoworkers to assemble the cars. When you buy your Toyota, you pay a sales tax, which the government uses to



support its expenditures on police, fire protection, national defense, the legal system, and other services. In short, many people in different areas of the economy are involved in what seems to be a single transaction.

We begin this chapter by examining the interaction of buyers and sellers in a market system. We then look at the main sectors of an economy—households, firms, the international, and the government—to determine how they interact.

## 1. The Market System

As we learned in Chapter 2, the production possibilities curve (PPC) represents all possible combinations of goods and services that a society can produce if its resources are used fully and efficiently. Which combination, that is, which point on the PPC, will society choose? In a price or market system, the answer is given by demand and supply. Consumers demonstrate what they are willing and able to pay for by buying different goods and services. If a business is to succeed, it must supply what people want at a price that people can afford.



**1** In a market system, who decides what goods and services are produced and how they are produced, and who obtains the goods and services that are produced?

### 1.a. Consumer Sovereignty

Tablet sales are dominating laptop computer sales, which exceed sales of desktop PCs. Smartphones have taken over from mobile phones. A smartphone can take care of all of your handheld computing and communication needs in a single, small package. The first smartphone was called Simon; it was designed by IBM in 1992. Smartphone adoption in the U.S. initially lagged that of other developed areas, such as Japan or Europe, but the North American market expanded considerably beginning in 2008.

In the 1990s, people wanted mobile devices to carry out those daily tasks. The BlackBerry, iPod, and other devices served various functions. By emphasizing convenience and flexibility, Nokia, Sharp, Fujitsu, and RIM grabbed a big share of the smartphone market worldwide, and Apple did well in North America. While these and a few manufacturers became successful, the star of the story is not these companies. It is the consumer. In a market system, if consumers are willing and able to pay for more powerful and flexible phones, more such phones appear. If consumers are willing and able to pay for a small phone that takes pictures and entertains you and does other tasks, such a phone will be available.

Why does the consumer have such power? The name of the game for business is profit, and the only way a business can make a profit is by satisfying consumer wants. Consumers, not politicians or business firms, ultimately determine what is to be produced. An entrepreneur or firm may introduce a new product—such as the iPod—something consumers had not thought about prior to its introduction, but once the product is introduced, the consumers determine whether that product will continue to be produced. A firm that produces something that no consumers want will not remain in business very long. **Consumer sovereignty**—the authority of consumers to determine what is produced through their purchases of goods and services—dictates what goods and services will be produced. Firms and inventors come up with new products, but if consumers are not willing and able to purchase these products, the products will not exist for long.

#### consumer sovereignty

The authority of consumers to determine what is produced through their purchases of goods and services.



## 1.b. Profit and the Allocation of Resources

When a good or service seems to have the potential to generate a profit, some entrepreneur will put together the resources needed to offer that good or service for sale. If the potential profit turns into a loss, the entrepreneur may stop buying resources and turn to some other occupation or project. The resources used in the losing operation will then be available for use in an activity where they are more highly valued.

To illustrate how resources get allocated in the market system, let's look at the market for PDAs and smartphones. The PDA was introduced in the market several years before the smartphone. Figure 1 shows a change in demand for PDAs. The initial demand curve,  $D_1$ , and supply curve,  $S$ , are shown in Figure 1(a). With these demand and supply curves, the equilibrium price ( $P_1$ ) is \$80, and the equilibrium quantity ( $Q_1$ ) is 100 thousand units per year. At this price-quantity combination, the number of PDAs demanded equals the number of PDAs offered for sale; equilibrium is reached, so we say that the market clears (there is no shortage or surplus).

The second part of the figure shows what happened when consumer tastes changed; people preferred to have a smartphone rather than just a PDA. This change in tastes caused the demand for PDAs to decline; illustrated by a leftward shift of the demand curve, from  $D_1$  to  $D_2$ , in Figure 1(b). The demand curve shifted to the left because fewer PDAs were demanded at each price. Consumer tastes, not the price of PDAs, changed first. (A price change would have led to a change in the quantity demanded and would be represented by a move *along* demand curve  $D_1$ .) The change in tastes caused a change in demand and a leftward shift of the demand curve. The shift from  $D_1$  to  $D_2$  created a new equilibrium point. The equilibrium price ( $P_2$ ) decreased to \$60, and the equilibrium quantity ( $Q_2$ ) decreased to 80 (thousand) units.

While the market for PDAs was changing, so was the market for smartphones. Figure 2(a) shows the original demand for the smartphone and its original price of \$500. Figure 2(b) shows a rightward shift of the demand curve, from  $D_1$  to  $D_2$ , representing the increased demand for smartphones. This demand change resulted in a higher market-clearing price for smartphones, from \$500 to \$600.

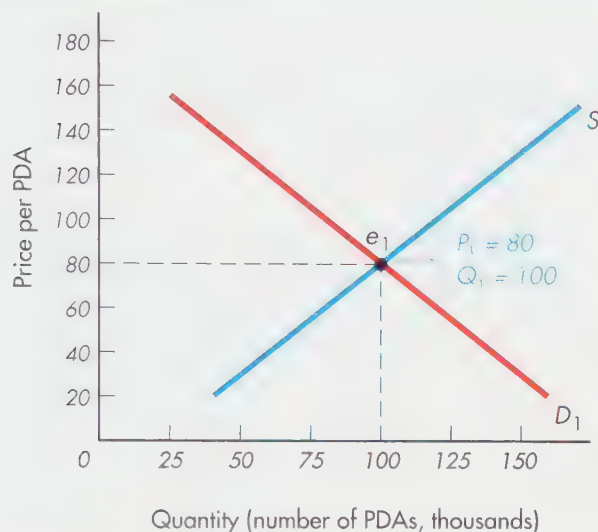
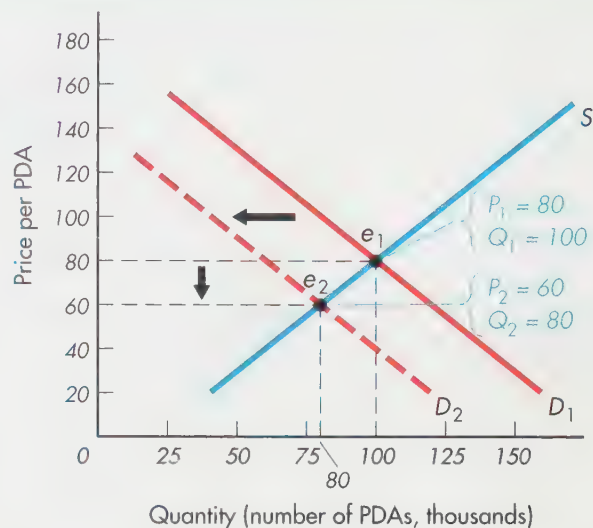
The changing profit potential of the two markets induced existing firms to switch from PDAs to smartphones and for new firms to offer smartphones from the start. Nokia dominated the smartphone market, but Apple, which at first did not offer smartphones, had to play catch up and begin offering its own smartphone. It did so with its iPhone.

As demand fell for the PDA, the market-clearing price of PDAs fell (from \$80 to \$60 in Figure 1[b]), and the quantity of PDAs sold also declined (from 100 to 80). The decreased demand led to a lower price, which meant that many PDA firms saw declining profits. In the smartphone business, the opposite occurred. As the demand for smartphones rose, the market-clearing price rose (from \$500 to \$600 in Figure 2[b]); the number of smartphones sold also rose (from 50 to 60 thousand). The increased demand, higher price, and resulting higher profit induced firms to increase production.

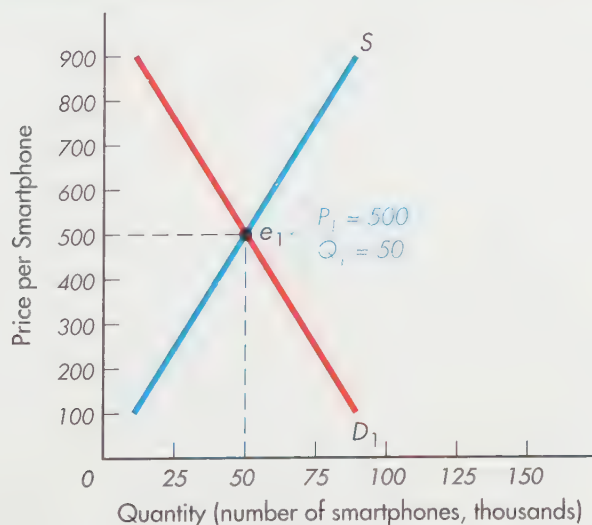
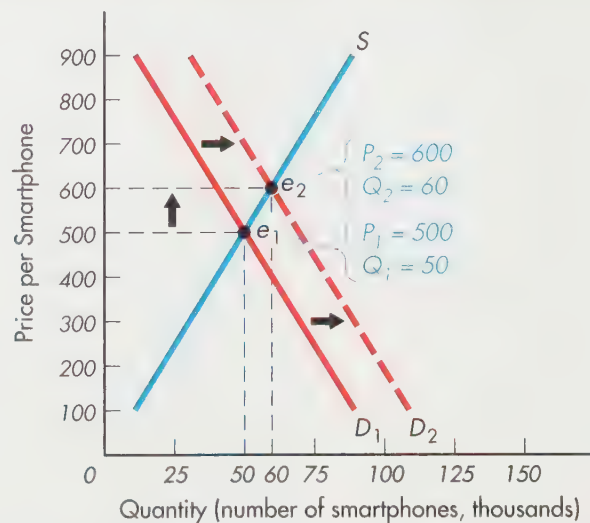
Why did the production of smartphones increase while the production of PDAs declined? Not because of a government decree. Not because of the desires of the business sector, especially the owners of the smartphone manufacturers. The consumer—*consumer sovereignty*—made all this happen. Businesses that failed to respond to consumer desires and failed to provide the desired good at the lowest price failed to survive.

## 1.c. Creative Destruction

After demand shifted to smartphones, the resources that had been used in the production of PDAs were available for use elsewhere. Some former employees were able to get jobs in the smartphone industry. Some of the equipment used in manufacturing PDAs was purchased by the smartphone firms; some of the components that previously would

**FIGURE 1** A Demand Change in the Market for PDAs**(a) PDA Market****(b) The Effect of a Change in Tastes on PDA Market**

In Figure 1(a), the initial market-clearing price ( $P_1$ ) and market-clearing quantity ( $Q_1$ ) are shown. In Figure 1(b), the market-clearing price and quantity change from  $P_1$  and  $Q_1$  to  $P_2$  and  $Q_2$  as the demand curve shifts to the left because of a change in tastes. The result of decreased demand is a lower price and a lower quantity produced.

**FIGURE 2** A Demand Change in the Market for Smartphones**(a) Smartphone Market****(b) The Effect of a Change in Tastes in Smartphone Market**

In Figure 2(a), the initial market-clearing price ( $P_1$ ) and quantity ( $Q_1$ ) are shown. In Figure 2(b), the demand for smartphones increases, thus driving up the market-clearing price ( $P_2$ ) and quantity ( $Q_2$ ) as the demand curve shifts to the right, from  $D_1$  to  $D_2$ .

have gone to the PDAs were used in the smartphones. Although some former employees of the PDA business became employed in the smartphone business, others had to find entirely new positions in totally different businesses. Some of the equipment used to manufacture PDAs was sold as scrap; other equipment was sold to other manufacturers. In other words, the resources moved from an activity where their value was relatively low to an activity where they were more highly valued. No one commanded the resources to move. They moved because they could earn more in some other activity.

This same story applies in case after case after case. The Sony Walkman was replaced by Apple's iPod, and the early iPod is now contained in the iPhone. The process of new products and new firms replacing existing products and firms is called *creative destruction*. This is what the market process is all about—creating new ideas, new products, and new ways of doing things, and replacing the obsolete, costly, and inefficient. Every year *Forbes* magazine publishes a list of the 100 largest companies in terms of sales. In 1987, *Forbes* compared that year's list to the 100 largest firms in 1917. Only 39 of the 1917 group remained in 1987. Of the 39 that remained in business, 18 had managed to stay in the top 100. Of the 18 that stayed in the top 100, only 2 had performed better than the market average—Kodak and GE. Both of these have since fallen, barely surviving. This seems an amazing change, but the pace of change has only quickened since 1987. Fewer than 25 percent of today's major corporations will continue to exist in 25 years.

In 1900, over 60 percent of the U.S. workforce was employed in agriculture. Today, less than 3 percent are employed in agriculture. Yet the U.S. produces far more agriculture today than it did in 1900. The technology used in agriculture so increased the productivity on farms that only 3 percent of the workforce is needed. Since 57 percent of the workforce that was in agriculture in 1900 is not today, where did workers go? Since they were no longer needed in agriculture, people received training in high technology or many other fields that had a greater value for them than working on the farm would have. In a sense, jobs on the farm were destroyed, but they were destroyed by the creation of new jobs in technology or services.

Firms produce the goods and services and use the resources that enable them to generate the highest profits. If one firm does this better than others, then that firm earns a greater profit than others. Seeing that success, other firms copy or mimic the first firm. If a firm cannot be as profitable as the others, it will eventually go out of business or move to another line of business where it can be successful. In the process of firms always seeking to lower their costs and make higher profits, society finds that the goods and services that buyers want are produced in the least costly manner. Not only do consumers get the goods and services that they want and will pay for, but they get these products at the lowest possible price.

### 1.d. The Determination of Income

Consumer demands dictate what is produced, and the search for profit defines how goods and services are produced. For whom are the goods and services produced; that is, who gets the goods and services? As we discussed in Chapter 3, in a price or market system, those who have the ability to pay for the products get the products. Your income determines your ability to pay, but where does income come from? A person's income is obtained by selling the services of the resources that person owns.

In reality, households own all resources. Everyone owns his or her own labor; some households also own land, and many also own firms or portions of firms. When a household owns shares of stock, it owns a portion of the firm whose shares it owns. Many households own shares of stock either as direct investments or as part of their retirement fund. The firm you or your parents work for might provide a 401(k) or some other retirement plan. A portion of these plans typically own shares of stock. All firms, whether



private firms or firms traded through stock markets, are owned by households in some way. Thus, if a firm acquires equipment, buildings, land, and natural resources, it is actually households that ultimately own those things. If a firm were taken apart and its parts sold off, households would end up with the money.

Typically we think of our income as what we are paid for our labor services. But you may also receive income from the shares of stock that you own (dividends and appreciation) and the various savings accounts that you own (interest). You may receive rent from being a landlord or from allowing a firm to use the services of your land. You may get profits from a business that you started.

## RECAP

1. In a market system, consumers are sovereign and decide by means of their purchases what goods and services will be produced.
2. In a market system, firms decide how to produce the goods and services that consumers want. In order to earn maximum profits, firms use the least-cost combinations of resources.
3. Income and prices determine who gets what in a market system. Income is determined by the ownership of resources.

## 2. The Private Sector

Buyers and sellers of goods and services and resource owners are linked together in an economy. For every dollar someone spends, someone else receives a dollar as income. In the remainder of this chapter, we learn more about the linkages among the sectors of the economy. We classify the buyers and the resource owners into the household sector; the sellers or business firms are the business sector; households and firms in other countries, who may also be buyers and sellers of this country's goods and services, are the international sector. These three sectors—households, business firms, and the international firms and consumers—constitute the **private sector** of the economy. The private sector refers to any part of the economy that is not part of government. The **public sector** refers to the government, government spending and taxing, and government sponsored and run entities. The relative sizes of private and public sectors vary from economy to economy. The market economies tend to have smaller public sectors relative to the total economy than do the more socialist or centrally planned economies.

### private sector

Households, businesses, and the international sector.

### public sector

The government.

### 2.a. Households

A **household** consists of one or more persons who occupy a unit of housing. The unit of housing may be a house, an apartment, or even a single room, as long as it constitutes separate living quarters. A household may consist of related family members, like a father, mother, and children, or it may comprise unrelated individuals, like three college students sharing an apartment. The person in whose name the house or apartment is owned or rented is called the householder.

Household spending is called **consumption**. Householders consume housing, transportation, food, entertainment, and other goods and services. Household spending (also called consumer spending) per year in the United States is shown in Figure 3, along with household income. The pattern is generally one of steady increase, but you can see that from the second quarter 2008 to the second quarter 2010, real household expenditures actually declined. (A quarter refers to three months.) This was a



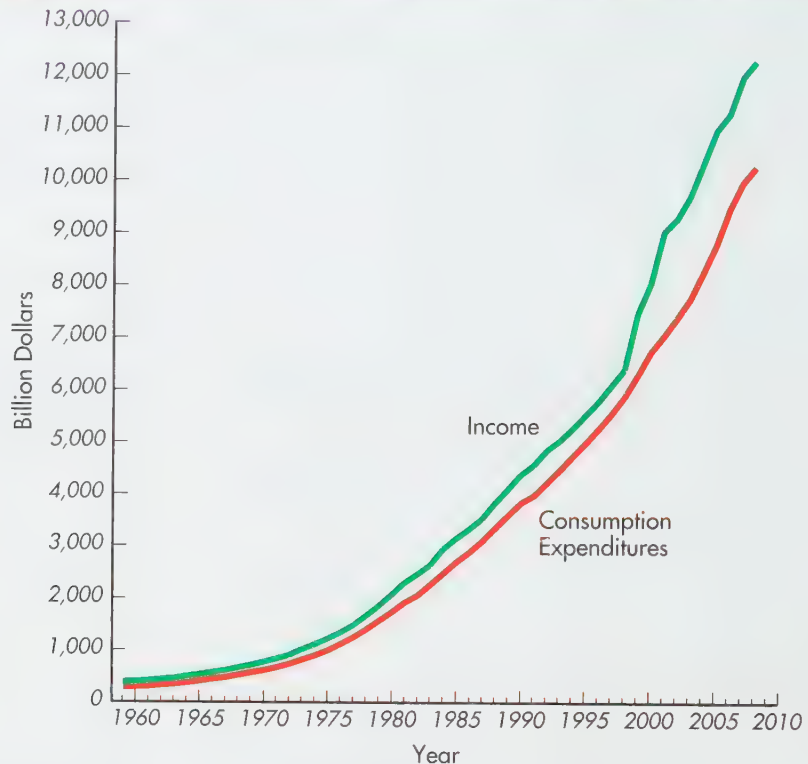
- 2 What is a household, and what is household income and spending?

### household

One or more persons who occupy a unit of housing.

### consumption

Household spending.

**FIGURE 3** Household Spending and Income

Source: U.S. Department of Commerce, Bureau of Economic Analysis; [www.census.gov](http://www.census.gov).



### 3 What is a business firm, and what is business spending?

#### business firm

A business organization controlled by a single management.

#### sole proprietorship

A business owned by one person who receives all the profits and is responsible for all the debts incurred by the business.

#### partnership

A business with two or more owners who share the firm's profits and losses.

#### corporation

A legal entity owned by shareholders whose liability for the firm's losses is limited to the value of the stock they own.

period of financial crisis and recession. Spending by the household sector is the largest component—constituting about 70 percent of total spending in the economy.

## 2.b. Business Firms

A **business firm** is a business organization controlled by a single management. The firm's business may be conducted at more than one location. The terms *company*, *enterprise*, and *business* are used interchangeably with *firm*.

Firms are organized as sole proprietorships, partnerships, or corporations. A **sole proprietorship** is a business owned by one person. This type of firm may be a one-person operation or a large enterprise with many employees. In either case, the owner receives all the profits and is responsible for all the debts incurred by the business.

A **partnership** is a business owned by two or more partners who share both the profits of the business and responsibility for the firm's losses. The partners can be individuals, estates, or other businesses.

A **corporation** is a business whose identity in the eyes of the law is distinct from the identity of its owners. State law allows the formation of corporations. A corporation is an economic entity that, like a person, can own property and borrow money in its own name. The owners of a corporation are shareholders. The corporation has limited liability, which means that if a corporation cannot pay its debts, creditors cannot seek payment from the shareholders' personal wealth. The shareholders' liability is limited to the value of the stock they own.

Many firms are global in their operations, even though they may have been founded and may be owned by residents of a single country. Firms typically first enter the international market by selling products to foreign countries. As revenues from these sales increase, the firms realize advantages by locating subsidiaries in foreign countries. Companies seek the location where taxes and regulations are the lowest and, of course, where profit potential is highest. A **multinational business** is a firm that owns and operates producing units in foreign countries. The best-known U.S. corporations are multinational firms. Ford, IBM, PepsiCo, and McDonald's all own operating units in many different countries. Ford Motor Company, for instance, is the parent firm of sales organizations and assembly plants located around the world.

Expenditures by business firms for capital goods—machines, tools, and buildings—that will be used to produce goods and services are called **investments**. Notice that the meaning of investment here is different from the everyday meaning, “a financial transaction such as buying bonds or stocks.” In economics, the term *investment* refers to business spending for capital goods.

Investment spending declined from 2007–2010; businesses had reduced expenditures on capital goods in 2007–2009 because sales had declined and the outlook for future sales was not very good. Investment is equal to roughly one-fourth of consumption, or household spending, but fluctuates a great deal more than consumption. Investment spending between 1959 and 2011 is shown in Figure 4. Compare Figures 3 and 4

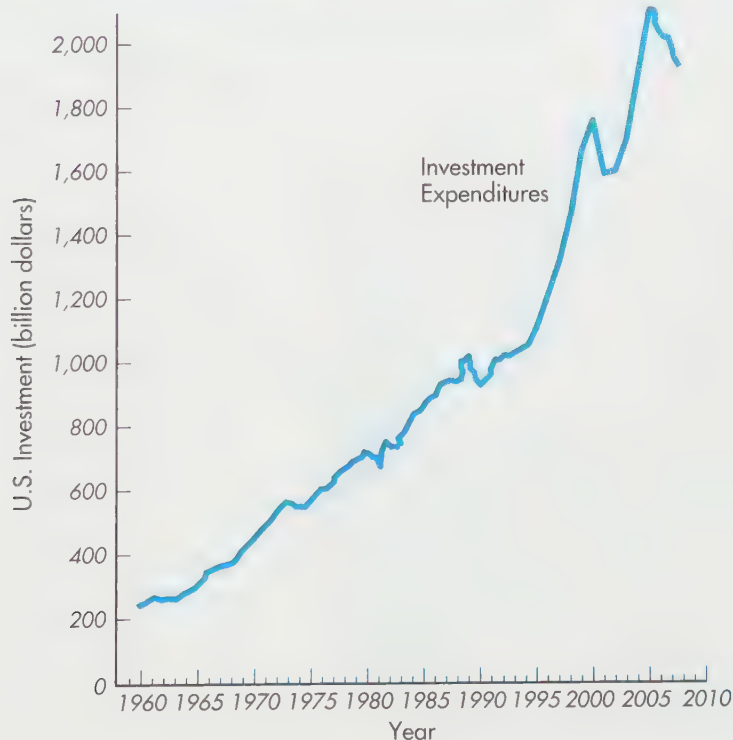
### multinational business

A firm that owns and operates producing units in foreign countries.

### investment

Spending on capital goods to be used in producing goods and services.

**FIGURE 4** U.S. Investment Spending



Business expenditures on capital goods have been increasing erratically since 1959.

Source: Economic Report of the President, 2010.



and notice how much investment fluctuates relative to consumption. Consumption normally rises at a fairly steady rate.



#### 4 How does the international sector affect the economy?

## 2.c. The International Sector

Economic conditions in the United States affect conditions throughout the world, and conditions in other parts of the world have a significant effect on economic conditions in the United States.

The nations of the world may be divided into two categories: industrial countries and developing countries. (Developing countries are often referred to as emerging markets or LDCs, less-developed countries.) Developing countries greatly outnumber industrial countries (see Figure 5). The World Bank (an international organization that makes loans to developing countries) groups countries according to per capita income (income per person). Low-income economies are those with per capita incomes of less than \$1,000. Middle-income economies have per capita annual incomes of \$1,000–\$10,000. High-income economies—oil exporters and industrial market economies—are distinguished from the middle-income economies and have per capita incomes of greater than \$10,000. Some countries are not members of the World Bank and so are not categorized, and information about a few small countries is so limited that the World Bank is unable to classify them.

It is readily apparent from Figure 5 that low-income economies are heavily concentrated in Africa and Asia. An important question in economics is: *Why?* Why are some countries rich and others poor? Why are poor countries concentrated in Africa and Asia with some in Latin America? These are questions discussed in both microeconomics and macroeconomics.

The World Bank uses per capita income to classify 23 countries as “industrial market economies.” They are listed in the bar chart in Figure 6. The 23 countries listed in

Figure 6 are among the wealthiest countries in the world. Not appearing on the list are the high-income oil-exporting nations like Libya, Saudi Arabia, Kuwait, and the United Arab Emirates. The World Bank considers those countries to be “still developing.”

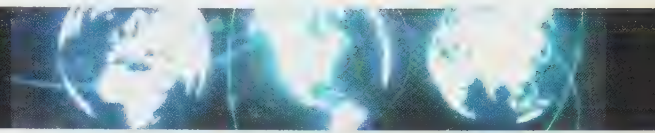
The economies of the industrial nations are highly interdependent. As conditions change in one country, business firms and individuals may shift large sums of money between countries. As funds flow from one country to another, economic conditions in one country spread to other countries. As a result, the major economic powers like the United States, the European Monetary Union, Japan, and China are forced to pay close attention to each other’s economic policies.

The United States tends to buy primary products such as agricultural produce and minerals from



“The best and brightest are leaving.” Statements like this are heard in many nations throughout the world. The best trained and most innovative people in many countries find their opportunities greater in the United States. As a result, they leave their countries to gain citizenship in the United States. But it is not easy for people to move from one country to another. The flow of goods and services among nations—international trade—occurs more readily than does the flow of workers.

## ECONOMIC INSIGHT



### The Successful Entrepreneur (Sometimes It's Better to Be Lucky Than Good)

Entrepreneurs do not always develop an abstract idea into reality when starting a new firm. Sometimes people stumble onto a good thing by accident and then are clever enough and willing to take the necessary risk to turn their lucky find into a commercial success.

In 1875, a Philadelphia pharmacist on his honeymoon tasted tea made from an innkeeper's old family recipe. The tea, made from 16 wild roots and berries, was so delicious that the pharmacist asked the innkeeper's wife for the recipe. When he returned to his pharmacy, he created a solid concentrate of the drink that could be sold for home consumption.

The pharmacist was Charles Hires, a devout Quaker, who intended to sell "Hires Herb Tea" to hard-drinking Pennsylvania coal miners as a nonalcoholic alternative to beer and whiskey. A friend of Hires suggested that miners would not drink anything called "tea" and recommended that he call his drink "root beer."

The initial response to Hires Root Beer was so enthusiastic that Hires soon began nationwide distribution. The yellow box of root beer extract became a familiar sight in homes and drugstore fountains across the United States. By 1895, Hires, who started with a \$3,000 loan, was operating a business valued at half a million dollars (a lot of money in 1895) and bottling ready-to-drink root beer across the country.

Hires, of course, is not the only entrepreneur who was clever enough to turn a lucky discovery into a business success. In 1894, in Battle Creek, Michigan, a sanitarium handyman named Will Kellogg was helping his older brother prepare wheat meal to serve to patients in the sanitarium's dining room. The two men would boil wheat dough and

then run it through rollers to produce thin sheets of meal. One day they left a batch of the dough out overnight. The next day, when the dough was run through the rollers, it broke up into flakes instead of forming a sheet.

By letting the dough stand overnight, the Kellogg's had allowed moisture to be distributed evenly to each individual wheat berry. When the dough went through the rollers, the berries formed separate flakes instead of binding together. The Kellogg's toasted the wheat flakes and served them to the patients. They were an immediate success. In fact, the brothers had to start a mailorder flaked-cereal business because patients wanted flaked cereal for their households.

Kellogg saw the market potential of the discovery and started his own cereal company (his brother refused to join him in the business). He was a great promoter who used innovations like four-color magazine ads and free-sample promotions. In New York City, he offered a free box of corn flakes to every woman who winked at her grocer on a specified day. The promotion was considered risqué, but Kellogg's sales in New York increased from two railroad cars of cereal a month to one car a day.

Will Kellogg, a poorly paid sanitarium worker in his mid-forties, became a daring entrepreneur after his mistake with wheat flour led to the discovery of a way to produce flaked cereal. He became one of the richest men in America because of his entrepreneurial ability.

**Source:** From FUCINI. ENTREPRENEURS. © 1985 Gale, a part of Cengage Learning, Inc. Reproduced by permission. [www.cengage.com/permissions](http://www.cengage.com/permissions).

the developing countries and manufactured products from the industrial nations. Products that a country buys from another country are called **imports**. Products that a country sells to another country are called **exports**. The United States tends to sell, or *export*, manufactured goods to all countries. There is a myth that the United States no longer has a manufacturing sector—that it has all been sent to China or other less-developed nations. But that is not true. While there are fewer jobs in manufacturing than in the past, the total manufacturing output has increased virtually every year. In addition, the United States is the largest producer and exporter of grains and other agricultural output in the world. The efficiency of U.S. farming relative to farming in much of the rest of the world gives the United States a comparative advantage in many agricultural products.

Economic activity of the United States with the rest of the world includes U.S. spending on foreign goods and foreign spending on U.S. goods. Figure 7 shows how U.S.

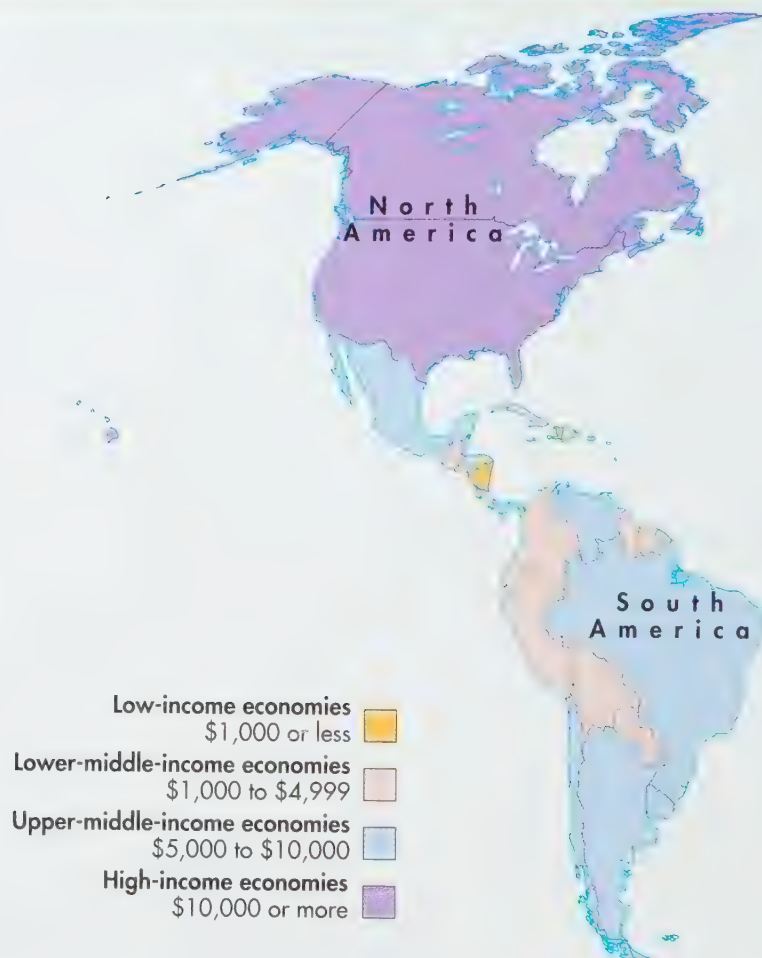
#### imports

Products that a country buys from other countries.

#### exports

Products that a country sells to other countries.



**FIGURE 5** World Economic Development

The colors on the map identify low-income, middle-income, and high-income economies. Countries have been placed in each group on the basis of GNP per capita and, in some instances, other distinguishing economic characteristics.

Source: World Bank; <http://nebula.worldbank.org/website/GNIwdi/viewer.htm>.

### trade surplus

The situation that exists when imports are less than exports.

### trade deficit

The situation that exists when imports exceed exports.

### net exports

The difference between the value of exports and the value of imports.

exports and imports are spread over different countries. Notice that the largest trading partners with the United States are Canada, Mexico, China, and Western Europe.

When exports exceed imports, a **trade surplus** exists. When imports exceed exports, a **trade deficit** exists. The term **net exports** refers to the difference between the value of exports and the value of imports: Net exports equals exports minus imports. Figure 8 traces U.S. net exports over time. Positive net exports represent trade surpluses; negative net exports represent trade deficits. The trade deficits (indicated by negative net exports) starting in the 1980s were unprecedented. Reasons for this pattern of international trade are discussed in later chapters.



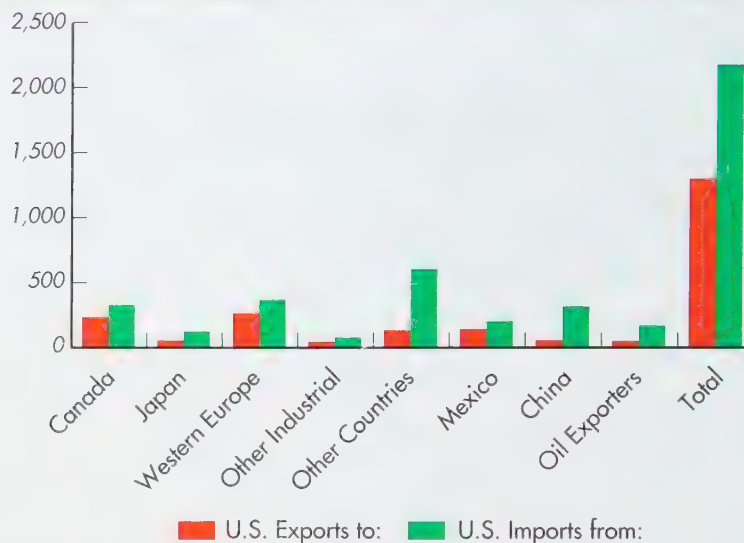
**FIGURE 6** The Industrial Market Economies

The bar chart lists some of the wealthiest countries in the world in terms of income per person.

**Source:** World Bank, *World Development Report*, 2009; <http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNOPC.pdf>.

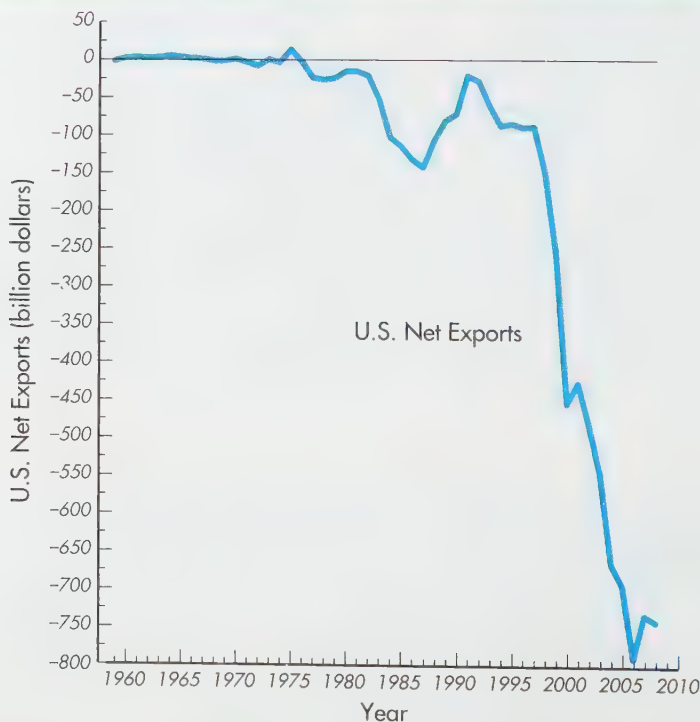
## RECAP

1. A household consists of one or more persons who occupy a unit of housing.
2. Household spending is called consumption.
3. Business firms may be organized as sole proprietorships, partnerships, or corporations.
4. Business investment spending fluctuates widely over time.
5. The majority of U.S. trade is with the industrial market economies.

**FIGURE 7** Direction of U.S. Trade

This chart shows that a trade deficit exists for the United States, since U.S. imports greatly exceed U.S. exports. The chart also shows that the largest trading partners with the U.S. are Western Europe, Japan, Canada, Mexico, and China.

**Source:** Economic Report of the President, 2010; [www.census.gov/foreigntrade/Press-Release/current\\_press\\_release/exh14a.xls](http://www.census.gov/foreigntrade/Press-Release/current_press_release/exh14a.xls).

**FIGURE 8** U.S. Net Exports

Prior to the late 1960s, the United States generally exported more than it imported and had a trade surplus. Since 1976, net exports have been negative, and the United States has had a trade deficit.

**Source:** Economic Report of the President, 2010; [www.gpoaccess.gov/eop/2010/B103.xls](http://www.gpoaccess.gov/eop/2010/B103.xls).



The United States Capitol is where the Senate and House of Representatives meet. The Capitol represents the public sector—government. Thomas Jefferson insisted the legislative building be called the “Capitol” rather than “Congress House.” He thought “Capitol” represented the shining city on a hill. The word *capitol* comes from Latin, meaning city on a hill.

### 3. The Public Sector

When we refer to the public sector, it is government that we are talking about, either federal, state, or local government. In the United States, government’s influence is extensive. From conception to death, individuals are affected by the activities of the government. Many mothers receive prenatal care through government programs. We are born in hospitals that are subsidized or run by the government. We are delivered by doctors who received training in subsidized colleges. Our births are recorded on certificates filed with the government. Ninety percent of students attend public schools as opposed to private schools. Many people live in housing that is directly subsidized by the government or have mortgages that are insured by the government. Most people, at one time or another, put savings into accounts that are insured by the government. Virtually all of us, at some time in our lives, receive money from the government—from student loan programs, unemployment compensation, disability insurance, social security, or Medicare. We drive on government roads, recreate on government lands, and fish in government waters.

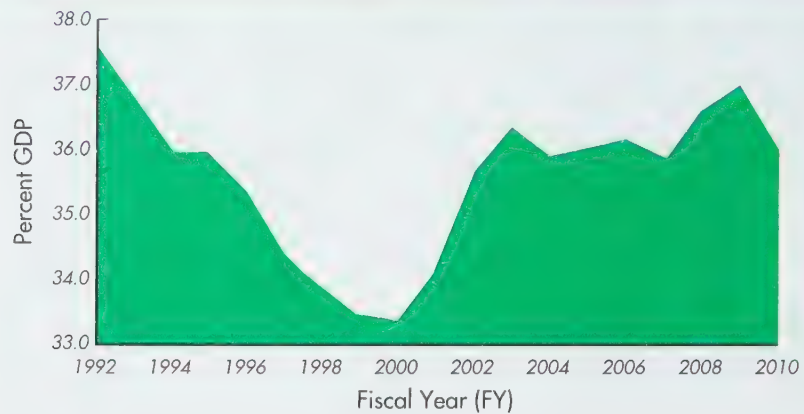


**5** What is the public sector? What is public sector spending?

#### 3.a. Growth of Government

Government in the United States exists at the federal, state, and local levels. The nation was founded as a “republic,” meaning that government is divided between the federal level and state and local levels. Local government includes county, regional, and municipal units. Economic discussions tend to focus on the federal government because national economic policy is set at that level. Nevertheless, each level affects us through its taxing and spending decisions and its laws regulating behavior. In the beginning of the United States, the federal government was a small player. States had the power—called states’ rights—because the country’s founders believed that government closest to



**FIGURE 9** U.S. Government Spending from FY 1992 to FY 2010

Total government spending—federal, state, and local divided by gross domestic product (GDP)—the total spending of all sectors in the economy.

Source: [www.usgovernmentspending.com](http://www.usgovernmentspending.com).

the people could be constrained better than a federal government. But virtually upon founding, people began to demand more federal government and less states' rights.

According to virtually any measure, total government in the United States has been a growth industry since 1930. The number of people employed by the local, state, and federal governments combined grew from 3 million in 1930 to more than 18 million today; there are now more people employed in government than in manufacturing. Annual expenditures by the federal government rose from \$3 billion in 1930 to nearly \$4 trillion today. In 1929, government spending constituted less than 2.5 percent of total spending in the economy. Today it is around 30 percent, as shown in Figure 9. The number of rules and regulations created by the government is so large that it is measured by the number of telephone book-sized pages needed just to list them, and that number is more than 70,000.



#### 6 How do the private and public sectors interact?

#### transfer payments

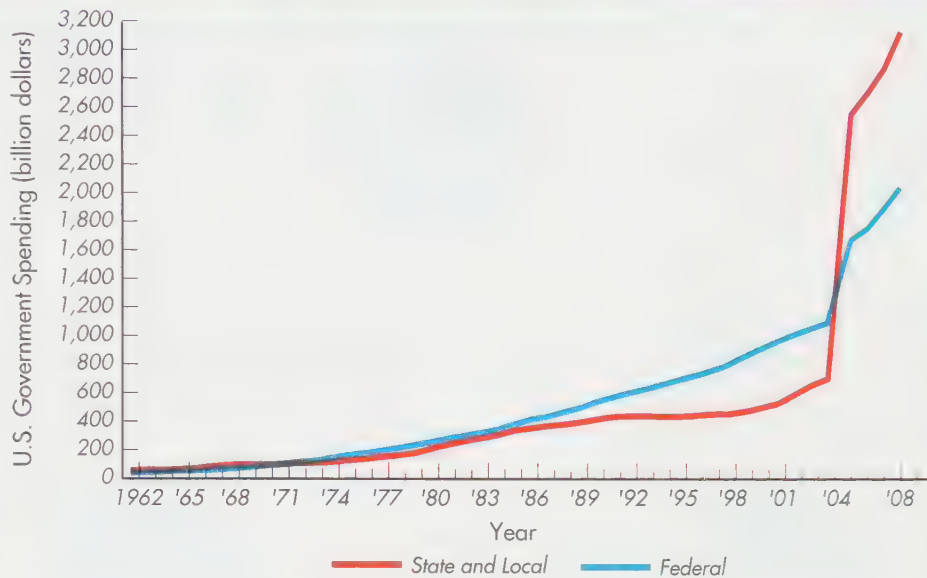
Income transferred by the government from a citizen who is earning income to another citizen.

### 3.b. Government Spending

Federal, state, and local government spending for goods and services is shown in Figure 10. Spending on goods and services by all levels of government combined is larger than investment spending but much smaller than consumption.

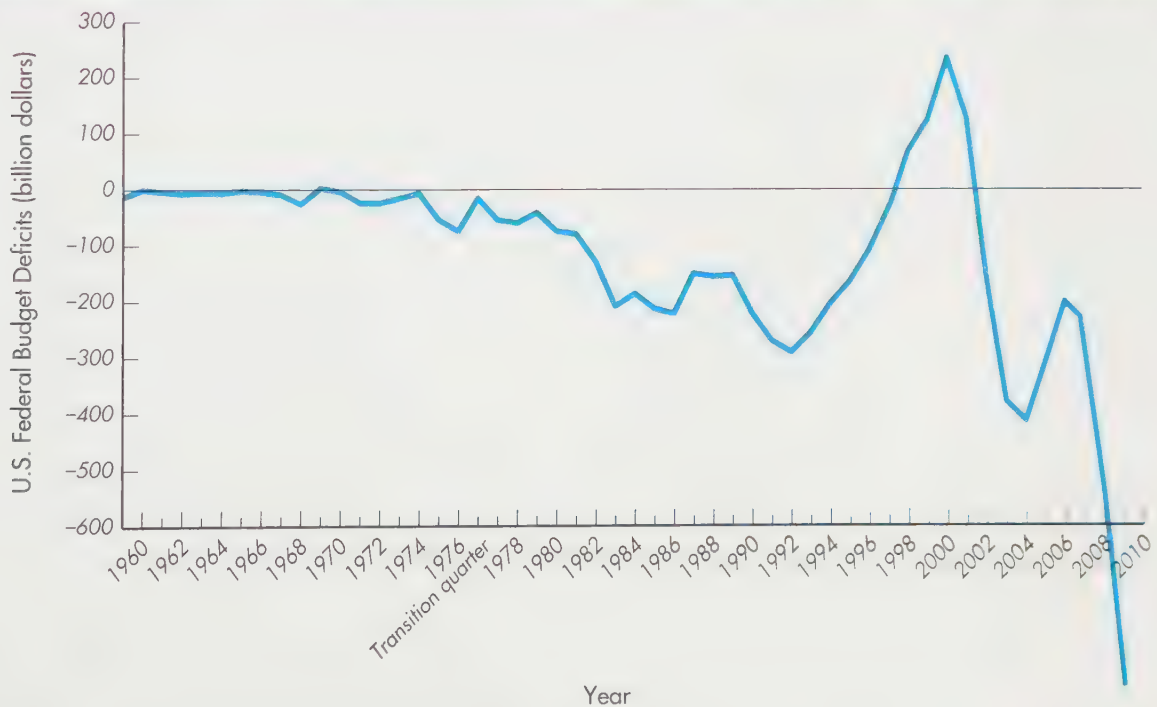
In addition to purchasing goods and services, government also takes money from some taxpayers and transfers it to others. Such **transfer payments** are a part of total government expenditures, so the total government budget is much larger than just the expenditures for goods and services. In 2011, total expenditures of federal, state, and local government for goods and services were about \$5.5 trillion. In this same year, transfer payments made by all levels of government were about \$2 trillion.

The magnitude of federal government spending relative to federal government revenue from taxes has become an important issue in recent years. Figure 11 shows that the federal budget was roughly balanced until the early 1970s. The budget is a measure of spending and revenue. A balanced budget occurs when federal spending is approximately equal to federal revenue. This was the case through the 1950s and 1960s.

**FIGURE 10** Federal, State, and Local Government Expenditures for Goods and Services

Government spending at federal and at state and local levels rose steadily from the 1960s until about 1980. Then state and local spending rose more quickly than federal spending until 2003. Since then, federal spending has increased at a very rapid pace.

**Source:** Data are from the *Economic Report of the President*, 2010.

**FIGURE 11** U.S. Federal Budget Deficits

The budget deficit is equal to the excess of government spending over tax revenue. If taxes are greater than government spending, a budget surplus (shown as a positive number) exists.

**Source:** Data are from the *Economic Report of the President*, 2010.

**budget surplus**

The excess that results when government spending is less than tax revenue.

**budget deficit**

The shortage that results when government spending is greater than tax revenue.

If federal government spending is less than tax revenue, a **budget surplus** exists. By the early 1980s, federal government spending was much larger than revenue, so a large **budget deficit** existed. The federal budget deficit grew very rapidly to about \$290 billion by the early 1990s before beginning to drop and turning to surplus by 1998. After four years of surpluses, a deficit was again realized in 2002, and the deficit has grown since then. It exploded in 2008–2011, leading to record levels of debt. Debt is the accumulation of deficits; each deficit adds to the debt. The total debt of the U.S. federal government exceeds \$14 trillion.

**RECAP**

1. The public sector refers to government.
2. Government spending is larger than investment spending but much smaller than consumption spending.
3. When government spending exceeds tax revenue, a budget deficit exists. When government spending is less than tax revenue, a budget surplus exists.

## 4. Linking the Sectors

Now that we have an idea of the size and structure of each of the private sectors—households, businesses, international—and the public sector—government—let’s see how the sectors are connected.

### 4.a. Households and the Rest of the Economy

Households own all the basic resources, or factors of production, in the economy. Household members own land and provide labor, and they are the stockholders, proprietors, and partners who own business firms. Businesses, governments, and foreign businesses employ the services of resources in order to produce goods and services. Households receive wages and benefits for their services.

What do households do with the income they receive? They spend most of it, they pay taxes, and they save some. When households save, they do so in different ways. The most common way is to deposit their savings in **financial intermediaries** such as banks and credit unions. They may also put money into pension funds, through what are called 401k funds or IRAs. These funds may be stocks and bonds, as well as cash. Financial intermediaries (banks, credit unions, etc.) use the deposits from savers to make loans to borrowers. Households borrow money to purchase homes, cars, and other items. Businesses borrow money to purchase machines, equipment, and buildings, and to hire labor. The money that is saved by households thus reenters the economy in the form of business spending.

Some economists like to illustrate how the sectors of the economy are connected by what is called “the circular flow diagram.” The **circular flow diagram** pictured in Figure 12 shows the household and business sectors only. Households provide resources and services to firms for wages and benefits. This is shown by the flow of resource services, a blue arrow running from households to firms and government, and payments for these services, a yellow arrow from firms to households. Households may spend part of their income and save part of it. The spending is shown as the payments for goods and services, a yellow arrow from the household sector to the business sector, and the flow of those goods and services from the business sector to the household sector is shown by the blue arrow. Household savings is shown as the orange arrow running from the

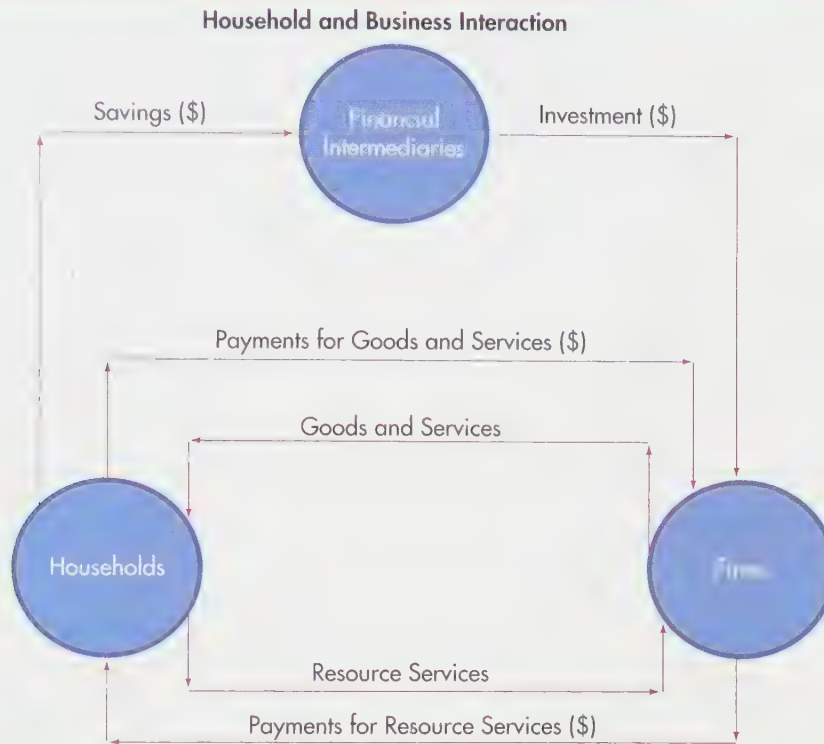
**financial intermediaries**

Institutions that accept deposits from savers and make loans to borrowers.

**circular flow diagram**

A model showing the flow of output and income from one sector of the economy to another.



**FIGURE 12** The Circular Flow: Households, Firms, Government, and Foreign Countries

Firms and governments hire resources from households. The payments for these resources represent household income. Households spend their income for goods and services produced by the firms. Household spending represents revenue for firms. Households save some of their income and pay taxes to the government. The amounts saved reenters the circular flow as investment spending. Financial intermediaries like banks take in the savings of households and then lend this money to business firms for investment spending. The diagram assumes that households and government are not directly engaged in international trade.

household sector to financial intermediaries. These intermediaries provide loans to households and businesses. The borrowing by businesses is shown by the orange arrow running from the financial intermediaries to firms (for simplification we don't draw the arrow running from intermediaries to households). Firms use the loans to invest—purchase equipment, buildings, and resources.

#### 4.b. Government

The government sector buys goods and services from businesses and hires labor from households. The government uses the resource services and goods and services to carry out its many activities. The government's revenues are primarily the taxes that households and firms pay, and expenditures by government include defense and nondefense items and activities.

#### 4.c. The International Sector

Foreign countries also affect and are affected by the household, business, and government sectors of the home country. We typically buy a foreign-made product from a local business firm rather than directly from the foreign producer. For instance,

glancing at products in retail stores, we can see “Made in China” or “Made in Mexico” on many of the products. Yet you purchase these from U.S. firms using dollars. The business firm purchases the items from the foreign countries. Even in some “Made in America” products you are purchasing foreign products and services. For instance, when you purchase an iPod, you are purchasing a product that has parts from Japan, the Philippines, Taiwan, and China, as well as the United States. This makes it difficult to accurately measure the relative values of goods and services purchased and sold from one country to another. About 30 to 40 percent of the iPod’s price is actually counted as an import (purchase of a Chinese good by the United States) from China to the United States. Nevertheless, we attempt to provide some measures of the extent of trade among nations with exports (sales) and imports (purchases).

As mentioned previously, net exports is the difference between exports of goods from one country and imports of goods by that country. Net exports of the home country may be either positive (a trade surplus) or negative (a trade deficit). When net exports are positive, there is a net flow of goods from the firms of the home country to foreign countries and a net flow of money from foreign countries to the firms of the home country. When net exports are negative, the opposite occurs. A trade deficit involves net flows of goods from foreign countries to the firms of the home country and net money flows from the domestic firms to the foreign countries. As an example, the United States has been a negative net exporter with China so that Chinese goods flowed to the United States while U.S. dollars flowed to China. If exports and imports are equal, net exports are zero because the value of exports is offset by the value of imports.

Adding the foreign sector to the circular flow diagram would produce a very complicated diagram with arrows running to and from each of the sectors, often through financial intermediaries. The point of the circular flow diagram is to illustrate that the various sectors of the economy are interconnected. What goes on in one sector affects what occurs in other sectors. For instance, when the government increases taxes on the business sector, the business sector might reduce employment and purchases of resources from the private sector. When the government increases its deficit (increases spending more than revenue), it might have to finance that debt by selling bonds to the financial intermediaries. This could reduce the amount of money the intermediaries have to lend to households and businesses. If households suddenly start saving more, then the funds available for firm investment are increased and, at the same time, household spending is reduced so that business sales of goods and services decline. Should the home country place a tax on foreign goods and services, households and businesses would reduce spending on foreign goods and increase spending on domestic goods, or those not subject to the higher tax. This could lead to retaliation by other countries, thereby reducing the home country’s sales to foreign businesses and households, or it could lead to higher prices domestically. As we will learn throughout our study of the economy, the sectors are interrelated and economies throughout the world are interconnected.

## RECAP

1. The private sector refers to the household, business, and nongovernmental international sectors.
2. The public sector refers to government.

## SUMMARY

1. In a market system, who decides what goods and services are produced and how they are produced, and who obtains the goods and services that are produced?
  - In a market system, consumers are sovereign and decide by means of their purchases what goods and services will be produced. §1.a
  - In a market system, firms decide how to produce the goods and services that consumers want. In order to earn maximum profits, firms use the least-cost combinations of resources. §1.c
  - Income and prices determine who gets what in a market system. Income is determined by the ownership of resources. §1.d
2. What is a household, and what is household income and spending?
  - A household consists of one or more persons who occupy a unit of housing. §2.a
  - Household spending is called consumption and is the largest component of spending in the economy. §2.a
3. What is a business firm, and what is business spending?
  - A business firm is a business organization controlled by a single management. §2.b
  - Businesses may be organized as sole proprietorships, partnerships, or corporations. §2.b
  - Business investment spending—the expenditure by business firms for capital goods—fluctuates a great deal over time. §2.b
4. How does the international sector affect the economy?
  - The international trade of the United States occurs predominantly with the other industrial economies. §2.c
  - Exports are products sold to the rest of the world. Imports are products bought from the rest of the world. §2.c
  - Exports minus imports equal net exports. Positive net exports mean that exports are greater than imports and a trade surplus exists. Negative net exports mean that imports exceed exports and a trade deficit exists. §2.c
5. What is the public sector? What is public sector spending?
  - The public sector refers to government, all levels of government—federal, state, and local. §3
  - When a government spends more than it receives in taxes, the government runs a deficit; when it receives more than it spends, it runs a surplus. §3.b
6. How do the private and public sectors interact?
  - Government interacts with both households and firms. Households get government services and pay taxes; they provide resource services and receive income. Firms sell goods and services to government and receive income. §4.b

## KEY TERMS

budget deficit, 86  
 budget surplus, 86  
 business firm, 76  
 circular flow diagram, 86  
 consumer sovereignty, 71  
 consumption, 75  
 corporation, 76

exports, 79  
 financial intermediaries, 86  
 household, 75  
 imports, 79  
 investment, 77  
 multinational business, 77  
 net exports, 80

partnership, 76  
 private sector, 75  
 public sector, 75  
 sole proprietorship, 76  
 trade deficit, 80  
 trade surplus, 80  
 transfer payments, 84



## EXERCISES

1. What is consumer sovereignty? What does it have to do with determining what goods and services are produced? Who determines how goods and services are produced? Who receives the goods and services in a market system?
  2. Is a family a household? Is a household a family?
  3. Which sector (households, business, or international) spends the most? Which sector spends the least? Which sector has the most volatility of spending?
  4. What does it mean if net exports are negative?
  5. Total spending in the economy is equal to consumption plus investment plus government spending plus net exports. If households want to save and thus do not use all of their income for consumption, what will happen to total spending? Because total spending in the economy is equal to total income and output, what will happen to the output of goods and services if households want to save more?
  6. People sometimes argue that imports should be limited by government policy. Suppose a government quota on the quantity of imports causes net exports to rise. Explain why total expenditures and national output may rise after the quota is imposed. Who is likely to benefit from the quota? Who will be hurt?
  7. Explain the effects of a decision by the household sector to increase saving.
  8. Suppose there are three countries in the world. Country A exports \$11 million worth of goods to country B and \$5 million worth of goods to country C; country B exports \$3 million worth of goods to country A and \$6 million worth of goods to country C; and country C exports \$4 million worth of goods to country A and \$1 million worth of goods to country B.
    - a. What are the net exports of countries A, B, and C?
    - b. Which country is running a trade deficit? A trade surplus?
  9. List the four sectors of the economy along with the type of spending associated with each sector. Order the types of spending in terms of magnitude, and give an example of each kind of spending.
  10. Using the interconnection between sectors of the economy, illustrate the effects of imposing an increase in taxes on the household sector.
  11. Explain how the government can run budget deficits—that is, spend more than it receives in tax revenue.
  12. What is the ratio of government spending to GDP? What is the ratio of payments on the debt (interest payments) to GDP? (You may find this at <http://www.gpoaccess.gov/eop/tables11.html>.)
  13. See if you can find the ratio of debt to GDP for several developed nations. Who has the highest ratio?
- You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

## IMPACT OF BAILOUTS

*The Globe and Mail (Canada), January 28, 2009*

### Geneva

**G**overnment bailouts of banks and the auto sector could trigger trade disputes over their impact on competition, the head of the World Trade Organization said yesterday. In a report to the WTO's 153 member states, director-general Pascal Lamy said state aid packages meant to stave off financial crises need to be implemented so they do not violate global trade rules or discriminate against foreign companies.

"Nothing can be said, for the time being, about the likely trade impact of these measures, many of which are still lacking publicly announced details," Mr. Lamy said, suggesting the market effects of cash infusions, guarantees and other bailout steps will become clearer with time.

"It must be recognized that some of the measures at least, which, in most cases, constitute some form of state aid or subsidy, may eventually have negative spillover effects on other markets or introduce distortions to competition between financial institutions," he said.

The WTO's dispute settlement body arbitrates disagreements between governments about tariffs, subsidies and other barriers that are seen to create an uneven playing field.

Some of the biggest WTO disputes to date have centered on the European Union's rules on banana imports, state aid for aircraft makers, and European bans on genetically modified foods. And auto industry aid packages in Canada, Germany, France, Australia, Argentina, South Korea, China and elsewhere all could lead to WTO complaints.

Efforts to infuse liquidity and remove toxic assets from big banks in the United States and Europe also could lead to WTO litigation if they disrupt the availability of funds or give domestic banks an unfair advantage, Mr. Lamy's report said.

Several countries have imposed trade-restricting policies since the onset of the financial crisis in September, 2008, the report said.

LAURA MACINNIS

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A government bailout is the government's transfer of money to a particular company or industry. The bailouts of auto manufacturing companies and banks means that the government is using tax revenues or running a deficit to provide the money to auto companies and banks either as a loan or a subsidy. Why would the director-general of the World Trade Organization (WTO), Pascal Lamy, state that "the aid packages meant to stave off financial crises need to be implemented so they do not violate global trade rules or discriminate against foreign companies"?

How could bailouts lead to trade restrictions? If an aid package from the U.S. government to the U.S. auto manufacturers—Ford, GM, and Chrysler—did not also provide aid to other auto manufacturers who produce in the United States, such as Toyota, BMW, and Honda, then it would provide an advantage to the U.S. auto makers compared to the foreign auto makers. Since the cost of manufacturing a car by Ford, GM, and Chrysler in the United States is about 25% more than the cost of manufacturing a

car by the foreign auto companies due to pay and benefits provided workers, the foreign auto producers have an advantage. They can offer the same quality car at a lower price than the U.S. companies can. Now, what occurs if the U.S. government offers billions of dollars in aid to the U.S. auto companies? The aid enables the U.S. companies to offer their products for lower prices than the foreign auto companies. Now the foreign auto companies are at a disadvantage. How can they offset the disadvantage? Their government could provide aid to them or, conversely, could penalize the U.S. government by imposing barriers on the sale of U.S. goods into their country.

The WTO is the World Trade Organization and is the body that deals with trade disputes among countries. The article notes how the WTO has been attempting to ensure that the bailouts and aid packages governments are providing industries do not serve to affect trade. But, as the WTO report notes, several trade restrictions have come about due to the bailouts.



## CHAPTER 5

# Elasticity: Demand and Supply

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### FUNDAMENTAL QUESTIONS

- 1 How do we measure how much consumers alter their purchases in response to a price change?
- 2 What determines whether consumers alter their purchases a little or a lot in response to a price change?
- 3 How do we measure how much changes in the determinants of demand affect consumer purchases?
- 4 How do we measure how much sellers respond to a price change?

**L**et's begin by trying to gain some perspective on what we have been doing and what we will be doing in the next few chapters. In the first four chapters of this book, we defined economics, opportunity costs, and the “economic way of thinking.” The economic way of thinking is to recognize that people are self-interested and as a result do those things that they expect will make them most satisfied or happiest. We say that people compare the costs and benefits of some activity, but it is the incremental, the additional costs and benefits, the change in costs and benefits, or what economists call the marginal costs and marginal benefits, that are important. It is the next minute, the next day, the next dollar, the next month's income that matter in people's decisions.

Economists describe behavior by saying that people compare marginal benefits and marginal costs. If the marginal benefits of some activity are larger than the

marginal costs, then people do that activity. If the marginal benefits are less than the marginal costs, then people do not do that activity. One of the things people do is trade or exchange. But, as we discovered, they trade only if they believe that the trade will make them better off. This is what the gains from trade are all about; all parties to a trade can gain and have to think they will gain, or else they will not trade.

The interaction of traders—of buyers and sellers—is represented by a market, that is, by demand and supply. Within a market, demand and supply determine the market price—the price at which buyers and sellers agree to trade.

In the first few chapters, we examined how markets work to allocate scarce goods, services, and resources.

### elasticity

The responsiveness of quantity demanded or quantity supplied to a change in one of the determinants of demand and/or supply.



- 1 How do we measure how much consumers alter their purchases in response to a price change?

### price elasticity of demand

The percentage change in the quantity demanded of a product divided by the percentage change in the price of that product.

We need to do more, however, if we are to understand why the world is what it is. We have to have a more in-depth understanding of demand and supply. We begin that process here. In this and the following chapter, we examine demand. We delve into the incentives and motivations of consumers. We begin in this chapter with an examination of the responsiveness of consumers and suppliers to changes in the determinants of demand and supply. This is called **elasticity**. By definition, elasticity is the *measure of the responsiveness of quantity demanded or quantity supplied to a change in price or some other important variable*. By “responsiveness” we mean “how much quantity demanded or quantity supplied changes with respect to a change in something else.”

## 1. The Price Elasticity of Demand

The manager of a local movie theater raised the price from \$9.50 to \$10 per movie in order to pay for a new sound system that he had installed. He knew that the higher price would lower ticket sales, but he expected to more than make this up with the higher ticket price. He found that not only had ticket sales declined, but his revenue had fallen as well. Where had the manager gone wrong? The error he made was not knowing what the price elasticity of demand was.

### 1.a. The Definition of Price Elasticity

The price elasticity of demand is a measure of the magnitude by which consumers alter the quantity of some product that they purchase in response to a change in the price of that product. The more price-elastic demand is, the more responsive consumers are to a price change—that is, the more they will adjust their purchases of a product when the price of that product changes. Conversely, the less price-elastic demand is, the less responsive consumers are to a price change.

The **price elasticity of demand**,  $e_d$ , is the percentage change in the quantity demanded of a product divided by the percentage change in the price of that product

$$e_d = \frac{\% \Delta Q^D}{\% \Delta P}$$

Notice that whenever  $P$  falls,  $Q^D$  rises, and when  $P$  rises  $Q^D$  falls. This means the price elasticity of demand is always negative.<sup>1</sup>

<sup>1</sup> Price elasticity is always negative since price and quantity demanded are inversely related. Economists often therefore refer to the absolute value of the price elasticity of demand; in other words, just ignore the negative sign. In this case: 1 is unit elastic, 0 to 1 is inelastic, and 1 to infinity is elastic.



- When price elasticity is between zero and  $-1$ , we say that demand is *inelastic*.
- When price elasticity is between  $-1$  and  $-\infty$ , we say that demand is *elastic*.
- When price elasticity is  $-1$ , we say that demand is *unit-elastic*.

## 1.b. Demand Curve Shapes and Elasticity

A **perfectly elastic demand curve** is a horizontal line that shows that consumers are willing and able to purchase any quantity at the single prevailing price but will switch to another seller at the flip of a switch. In Figure 1(a), a perfectly elastic demand curve represents the demand for the wheat harvested by a single farmer in Canada. The Canadian farmer is only one small producer of wheat, and because he is just one among many, he is unable to charge a price that differs from the price of wheat in the rest of the world. If this farmer's wheat is even slightly more expensive than wheat elsewhere, consumers will buy the wheat produced by other farmers in Canada and the rest of the world and leave this now slightly higher priced farmer without any business.

A **perfectly inelastic demand curve** is a vertical line, illustrating the idea that consumers cannot or will not change the quantity of a good they purchase when the price of the product is changed. Perhaps insulin to a diabetic is a reasonably vivid example of a good whose demand is perfectly inelastic. Of course, this behavior holds only over a certain price range. Eventually, the price would get so high that even a diabetic would be forced to decrease the quantity demanded. Figure 1(b) shows a perfectly inelastic demand curve.

In between the two extreme shapes of demand curves are the demand curves for most products. Figure 1(c) shows two downward-sloping straight-line demand curves,  $D_1$  and  $D_2$ . The first demand curve, the steeper one,  $D_1$ , represents a more inelastic demand. The flatter curve,  $D_2$ , is more elastic. So we could use  $D_1$  to represent the monthly demand for gasoline; it says that even if the price rises by quite a bit, the quantity of gasoline demanded declines by only a small amount. We could use the more

### perfectly elastic demand curve

A horizontal demand curve indicating that consumers can and will purchase all they want at one price.

### perfectly inelastic demand curve

A vertical demand curve indicating that there is no change in the quantity demanded as the price changes.

FIGURE 1 The Price Elasticity of Demand

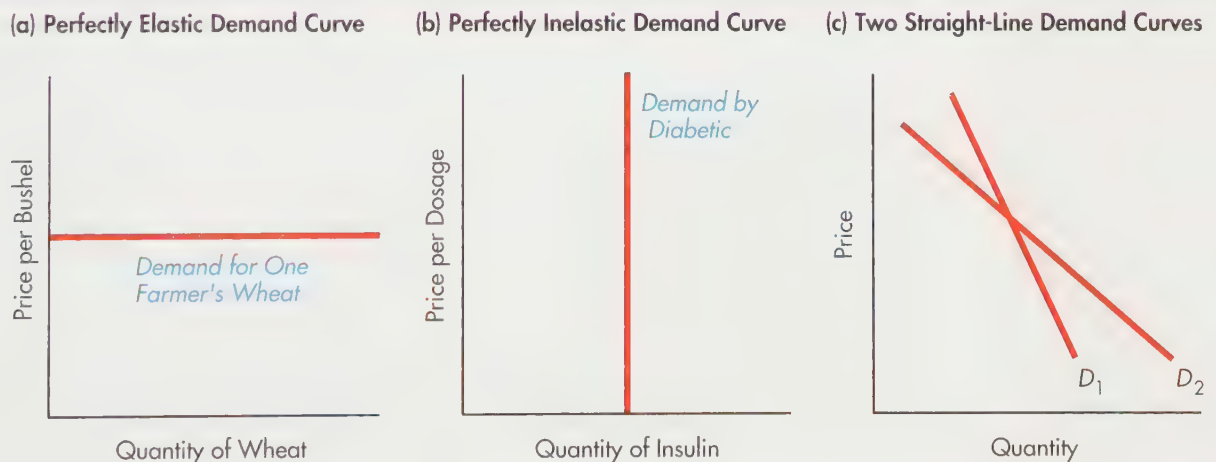


Figure 1(a), a perfectly elastic demand curve, represents the demand for one farmer's wheat. Because there are so many other suppliers, buyers purchase wheat from the least expensive source. If this farmer's wheat is priced ever so slightly above other farmers' wheat, buyers will switch to another source. Also, because this farmer is just one small producer in a huge market, he can sell everything he wants at the market price. Figure 1(b), a perfectly inelastic demand curve, represents the demand for insulin by a diabetic. A certain quantity is necessary to satisfy the need regardless of the price. Figure 1(c) shows two straight-line demand curves,  $D_1$  and  $D_2$ . These demand curves are neither perfectly elastic nor perfectly inelastic.



elastic demand curve,  $D_2$ , to represent the demand for gasoline at a single station; it would say that as the price of gasoline at the corner Shell station increases, consumers decide to go to the Chevron station down the street instead of buying at the now more expensive Shell station.

**1 b.1. Price Elasticity Changes along a Straight-Line Demand Curve** While we describe an entire demand curve as being more or less elastic than some other curve, we also note that the price elasticity of demand changes as we move up or down a straight-line demand curve. The price elasticity becomes more inelastic as we move down the curve. When we say that an entire demand curve is more elastic than another, such as  $D_2$  compared to  $D_1$ , we are just saying that at every single price,  $D_2$  is more elastic than  $D_1$ .

*Demand is price-elastic at the top of the demand curve and inelastic at the bottom.*

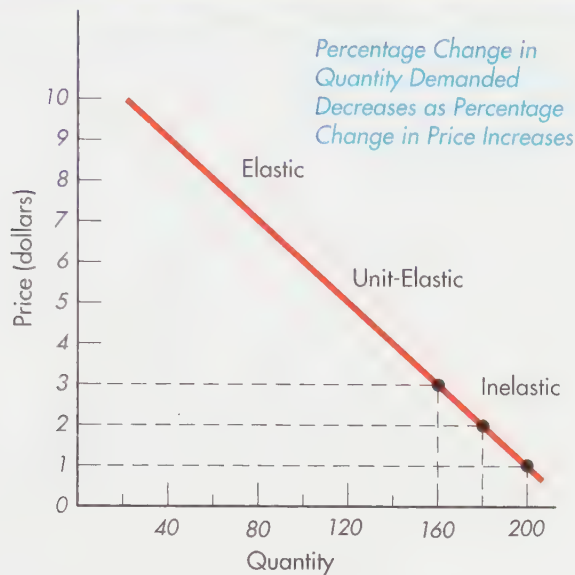
All downward-sloping straight-line demand curves are divided into three parts by the price elasticity of demand: the *elastic region*, the *unit-elastic point*, and the *inelastic region*. The demand is elastic from the top of the curve to the unit-elastic point. At all prices below the unit-elastic point, demand is inelastic.

### 1.c. The Price Elasticity of Demand Is Defined in Percentage Terms

The price elasticity of demand is the *percentage* change in the quantity demanded divided by the *percentage* change in the price. By measuring the price elasticity of demand in terms of percentage changes, economists are able to compare the way consumers respond to changes in the prices of different products. For instance, the change in sales caused by a 1 percent increase in the price of gasoline (measured in gallons) can be compared to the change in sales caused by a 1 percent change in the price of a Big Gulp. Percentage changes ensure that we are comparing apples to apples, not apples to oranges. What sense could be made of a comparison between the effects on quantity demanded of a \$1 rise in the price of college tuition, from \$10,000 to \$10,001, and a \$1 rise in the price of a Big Mac, from \$4 to \$5? But the consumer's reaction to a 1 percent change in tuition could be compared to the consumer's reaction to a 1 percent change in the price of a Big Mac.

In section 1.b, it was pointed out that the price elasticity changes along a straight line demand curve. This is because elasticities are measured in percentage terms. Along a straight-line demand curve, equal dollar changes in price mean equal unit changes in quantity. For instance, if price changes by \$1 in Figure 2, quantity demanded changes by 20 units; if price changes from \$1 to \$2, quantity demanded falls from 200 to 180; if price changes from \$2 to \$3, quantity demanded falls from 180 to 160; and so on. Each \$1 change in price means a 20-unit change in quantity demanded. But those same amounts (constant amounts of \$1 and 20 units) do not translate into constant percentage changes.

A \$1 change at the top of the demand curve is a significantly different percentage change from a \$1 change at the bottom of the demand curve. A \$1 change from \$10 is a 10 percent change, but a \$1 change from \$2 is a 50 percent change. Thus, as we move down the demand curve from higher to lower prices, a given dollar change becomes a larger and larger percentage change in price. The opposite is true of quantity changes. As we move downward along the demand curve, the same change in quantity becomes a smaller and smaller percentage change. A 10-unit change from 20 is a 50 percent change, while a 10-unit change from 200 is a 5 percent change. As we move down the straight-line demand curve—thus increasing quantity and reducing price—the percentage change in quantity demanded declines and the percentage change in price increases.

**FIGURE 2** The Price Elasticity of Demand Varies along a Straight-Line Demand Curve

As we move down the demand curve, the price elasticity varies from elastic to unit-elastic to inelastic.

### 1.d. Determinants of the Price Elasticity of Demand

The degree to which the demand is price-inelastic or price-elastic depends on the following factors, which differ among products and among consumers:

- How many substitutes there are
- How well a substitute can replace the good or service under consideration
- The importance of the product in the consumer's total budget
- The time period under consideration

The more substitutes there are for a product, the greater the price elasticity of demand. If you can buy something else when the price of an item goes up and be just as well off, then your demand is elastic. For instance, whether you buy gasoline at one station or another might depend on which one of them charges a penny more a gallon; if so, your demand for gas at a single station is very elastic. In contrast, diabetics have no substitute for insulin, so their demand for insulin is inelastic.

The greater the portion of the consumer's budget that a good constitutes, the more elastic is the demand for the good. Because a new car and an overseas vacation are quite expensive, even a small percentage change in their prices can represent a significant portion of a household's income. As a result, a 1 percent increase in price may cause many households to delay the purchase of a car or a vacation. Coffee, on the other hand, accounts for such a small portion of a household's total weekly expenditures that a large percentage increase in the price of coffee will probably have little effect on the quantity of coffee purchased. The demand for vacations is most likely quite a bit more elastic than the demand for coffee.

The longer the time period under consideration, the more elastic is the demand for any product. The demand for most goods and services will have a lower price elasticity over a shorter time period and will be more price-elastic over a longer span of time. For



- 2** What determines whether consumers alter their purchases a little or a lot in response to a price change?

instance, the demand for gasoline is very inelastic over a period of a month. No good substitutes are available in so brief a period. Over a 10-year period, however, the demand for gasoline is much more elastic. The additional time allows consumers to alter their behavior to make better use of gasoline and to find substitutes for gasoline.

## RECAP

1. The price elasticity of demand is a measure of the degree to which consumers will alter the quantities of a product that they purchase in response to changes in the price of that product. The price elasticity of demand is the percentage change in the quantity demanded divided by the corresponding percentage change in the price.
2. When the price elasticity of demand lies between  $-1$  and  $-\infty$ , demand is said to be *elastic*. When the price elasticity of demand is equal to  $-1$ , demand is said to be *unit-elastic*. When the price elasticity of demand lies between  $-1$  and  $0$ , demand is said to be *inelastic*.
3. The price elasticity of demand depends on how readily and easily consumers can switch their purchases from one product to another.
4. Everything else held constant, the greater the number of close substitutes, the greater the price elasticity of demand.
5. Everything else held constant, the greater the proportion of a householder's budget that a good constitutes, the greater the householder's price elasticity of demand for that good.
6. Everything else held constant, the longer the time period under consideration, the greater the price elasticity of demand.

## 2. Other Demand Elasticities

A price change leads to a movement along the demand curve. When something that affects demand, other than price, changes, the demand curve shifts. How far the demand curve shifts is measured by elasticity—the elasticity of the variable whose value changes. As we saw in Chapter 3, “Markets, Demand and Supply, and the Price System,” demand is determined by income, prices of related goods, expectations, tastes, number of buyers, and international effects. A change in any one of these “determinants of demand” will cause the demand curve to shift, and a measure of elasticity exists for each. The *income elasticity of demand* is calculated by comparing the same price on two demand curves that are different only because income is different. This is illustrated in Figure 3. It is the percentage change in quantity demanded caused by a given percentage change in income. The *cross-price elasticity of demand* measures the percentage change in quantity demanded caused by a given percentage change in the price of a related good. The *advertising elasticity of demand* measures the percentage change in quantity demanded caused by a given percentage change in advertising expenditures (change in tastes), and so on. Each elasticity is calculated by dividing the percentage change in quantity demand by the percentage change in the variable under consideration. Figure 3 would illustrate each of the elasticities noted here by altering which determinant of demand causes the curve to shift.



- 3** How do we measure how much changes in the determinants of demand affect consumer purchases?

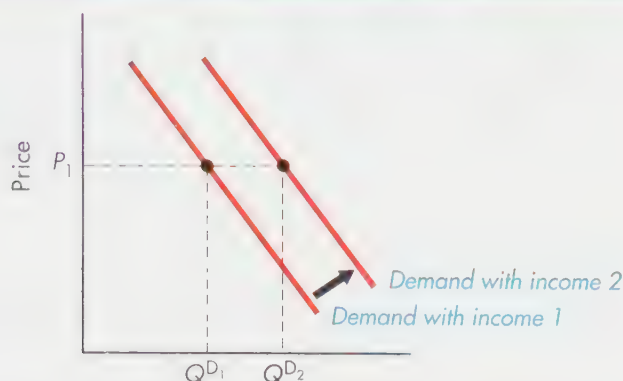
### cross-price elasticity of demand

The percentage change in the quantity demanded for one good divided by the percentage change in the price of a related good, everything else held constant.

### 2.a. The Cross-Price Elasticity of Demand

The **cross-price elasticity of demand** measures the degree to which goods are substitutes or complements (for a discussion of substitutes and complements, see Chapter 3). The cross-price elasticity of demand is defined as the percentage change in the quantity demanded of one good divided by the percentage change in the price of a related good, everything else held constant.



**FIGURE 3** Income Elasticity of Demand

When income rises, demand shifts out. (Similarly, when the other determinants of demand change, the demand curve shifts.) The distance demand shifts at a given price is measured by the income elasticity of demand.

When the cross-price elasticity of demand is positive, the goods are substitutes; when the cross-price elasticity of demand is negative, the goods are complements. If a 1 percent *increase* in the price of a movie ticket leads to a 5 percent *increase* in the quantity of movies that are downloaded off the Internet, movies at the theater and downloaded movies are substitutes. If a 1 percent rise in the price of a movie ticket leads to a 5 percent *drop* in the quantity of popcorn consumed, movies and popcorn are complements.

## 2.b. The Income Elasticity of Demand

The income elasticity of demand measures the magnitude of consumer responsiveness to income changes. The **income elasticity of demand** is defined as the percentage change in the quantity demanded for a product divided by the percentage change in income, everything else held constant.

Goods whose income elasticity of demand is greater than zero are **normal goods**. Products that are often called necessities have lower income elasticities than products known as luxuries. Gas, electricity, health-oriented drugs, and physicians' services might be considered necessities. Their income elasticities are about 0.4 or 0.5. On the other hand, people tend to view dental services, automobiles, and private education as luxury goods. Their elasticities are 1.5 to 2.0.

When the income elasticity of demand for a good is negative, the good is called an **inferior good**. Some people claim that potatoes, rice, and beans are inferior goods because people who have very low levels of income eat large quantities of these goods but give up those items and begin eating fruit, fish, and higher-quality meats as their incomes rise. Smoking seems to be an inferior good—as income rises, people smoke less.

Clean air, on the other hand, is a **luxury good**. As incomes rise, people are willing to pay to have cleaner air. Air pollution is a problem throughout the world, but air pollution in the poorest nations is much worse than that in the wealthiest nations. Air pollution in India, much of Africa, and China is so bad that associated health problems are epidemic. Isn't it logical that if these nations improved their air, they would improve the condition of their populations considerably, which would contribute to economic growth? It does seem logical, but the problem is that because they have little income, these nations would have to forgo other important things in order to devote resources to cleaning the air. And taking resources away from other areas of the economy, such as

### income elasticity of demand

The percentage change in the demand for a good divided by the percentage change in income, everything else held constant.

### normal goods

Goods for which the income elasticity of demand is positive.

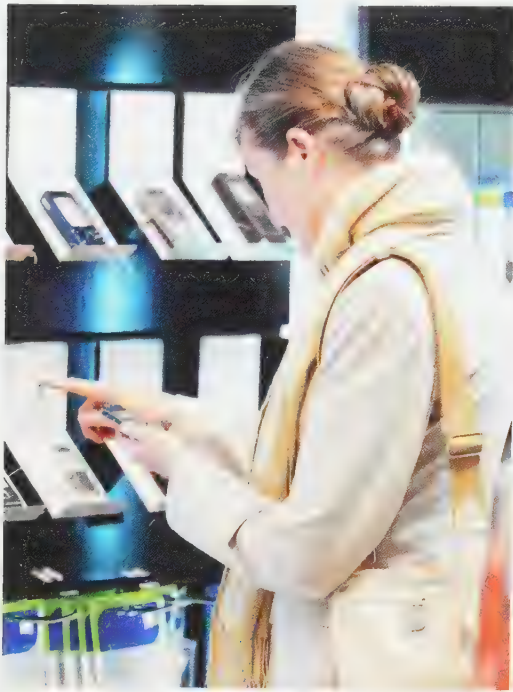
*Note that the sign of cross-price and income elasticities of demand are not always negative or positive.*

### inferior goods

Goods for which the income elasticity of demand is negative.

### luxury goods

Goods for which the income elasticity of demand is a large positive number.



A woman compares the features of new phones. The quantity of mobile phones purchased as income rises is positive; the income elasticity of demand for mobile phones is positive. Not only is it positive, but it is larger than 1, indicating that as income rises by 10 percent, the quantity of phones purchased rises by more than 10 percent.

### point elasticity

Price elasticity of demand measured at a single point on the demand curve.

### arc elasticity

Price elasticity of demand measured over a range of prices and quantities along the demand curve.

health care, could lead to more serious health problems than are caused by the pollution. It turns out that a nation will not begin devoting resources to cleaning its air until its per capita income is above \$15,000 per year, and a nation with over \$15,000 in income per year per person is considered to be a rich nation. The greater a nation's per capita income, the more likely it is that it can reduce air pollution. Air pollution *reduction* is a luxury good—as income rises, a lot more of pollution reduction is demanded.

## 2.c. Calculating Elasticity

Price elasticity can be calculated in one of two ways, the **point elasticity** and the **arc elasticity**. The interpretation of the two is essentially the same—a measure of the responsiveness of consumers to a price change. The difference is that the point elasticity applies to a single price, while the arc elasticity applies to a price range. The point elasticity is a measure of the sensitivity of consumers to a very small price change from a particular price. The arc elasticity is a measure of the sensitivity of consumers to a larger price change—a range from one price to another.

The calculation of elasticity involves finding the percentage change. The formula for figuring out the percentage change in something, say  $X$ , is as follows:

$$\frac{(X_2 - X_1)}{X_1}$$

For example, if  $X$  increased from 1.00 to 1.25, we would have:

$$\frac{(1.25 - 1.00)}{1.00}$$

or 25%.

**2.c.1. Point Elasticity** The price elasticity is, therefore, just the ratio of two percentage changes:

$$\frac{\% \text{ Change in } Q}{\% \text{ Change in } P} = \frac{(Q_2 - Q_1)/Q_1}{(P_2 - P_1)/P_1}$$

This can be written in a simpler form by performing a slight modification (invert the denominator and multiply):

$$\frac{(Q_2 - Q_1)}{(P_2 - P_1)} \left[ \frac{P_1}{Q_1} \right]$$

Part 1 in this formula is the change in quantity divided by the change in price.

$$\frac{(Q_2 - Q_1)}{(P_2 - P_1)}$$

which can be written as:

$$\frac{\Delta Q}{\Delta P}$$

Part 2 is the initial price divided by the initial quantity.

$$\frac{P_1}{Q_1}$$

Thus, the point price elasticity of demand is  $[\Delta Q / \Delta P] * [P / Q]$ .

What does the point elasticity look like graphically? Remember that when we graph demand and supply, price ( $P$ ) is always on the vertical axis, and quantity ( $Q$ ) is always on the horizontal axis. This means that Part 1 of the elasticity formula is the inverse of the

slope of the demand curve. The slope is the rise/run or  $[\Delta P/\Delta Q]$ . Part 1 of the price elasticity formula is run/rise or  $[\Delta Q/\Delta P]$ . If the demand curve is a straight line, the slope is a constant number. For instance, if the equation has the form  $P = aQ + B$ , Part 1 is  $1/a$ .

Part 2 is  $(P_1/Q_1)$ . There is *one* price and *one* quantity in this second part; a single *point* on the curve. Part 2 will change as we move along the demand curve. If we start at a low price and high quantity (remember, the law of demand states that price and quantity are inversely related), then  $P/Q$  is a small number. As we move up the demand curve,  $P/Q$  gets larger (as we go up the demand curve,  $P$  increases and  $Q$  decreases).

Since Part 1 is constant (the inverse of the slope), and Part 2 is a variable that gets larger as we move up the demand curve, demand gets more elastic as we move up the demand curve.

**2.c.2. Arc Elasticity** The difference between the two formulas, arc and point, is the base. In the point elasticity formula, the initial price and quantity,  $P_1$  and  $Q_1$ , are used as the base rather than the average or midpoint over the entire price and quantity range. The arc elasticity is calculated in the following way:

$$\frac{[Q_2 - Q_1]/[Q_2 + Q_1]/2}{[P_2 - P_1]/[P_2 + P_1]/2}$$

Notice that  $[Q_2 + Q_1]/2$  is the average quantity and  $[P_2 + P_1]/2$  is the average price over the price range from  $P_1$  to  $P_2$ . So the arc elasticity formula is simply the change in quantity divided by the change in price multiplied by the ratio of the average price to the average quantity.

$$[\Delta Q/\Delta P] [\text{average } P/\text{average } Q]$$

As an example, suppose that at a price of \$6 per ticket, the average moviegoer demands 2 tickets per month, and at a price of \$4 per ticket, the average moviegoer purchases 6 tickets per month. Calculate the price elasticity of demand using the arc and the point elasticity. First, the arc elasticity. The change in quantity demanded is  $(Q_2 - Q_1) = 6 - 2 = 4$ . The *percentage change* is the change divided by the base. The base is the average of the two quantities:  $(Q_1 + Q_2)/2$ . With 4 as the base, the change in quantity demanded divided by the base is  $4/4 = 1$ . The change in price is  $\$4 - \$6$  and the average price is  $[\$6 + \$4]/2 = \$5$ . So the price elasticity is

$$1/(-2/5) = -5/2 = -2.5$$

According to these calculations, demand is elastic over the price range \$4 to \$6.

Using the same information, the point elasticity is the *change* in quantity demanded  $(Q_2 - Q_1) = 4$ . The change in price is  $-\$2$ , from \$6 to \$4. So dividing change in quantity by change in price and multiplying by the price divided by the quantity we get:

$$\text{Elasticity} = (4/2)/(-2/6) = -6$$

According to the calculations, demand is elastic at  $P = \$6$ .

**2.c.3. Income and Cross-Price Elasticities** The calculation of income and cross-price elasticities is virtually identical to that of the price elasticity of demand. We find the change in quantity that results from a change in either income or the price of a related good. We then multiply that by the ratio of the initial levels of the variables.

The definition of income elasticity is:  $\Delta Q/\Delta I * I/Q$  where  $I$  represents income. So if income changes from 100 to 120 while quantity demanded changes from 4 to 5, then the income elasticity of demand is:  $(1/20)(100/4) = 1.25$ . The good can be called a normal good.

The definition of the cross-price elasticity of demand is:  $\Delta Q/\Delta P_x * P_x/Q$ , where  $P_x$  is price of a related good. Suppose quantity increases from 4 to 6 when  $P_x$  increases from \$20 to \$25. The cross-price elasticity is:  $(2/5)(20/4) = 2$ . Since the cross-price elasticity is positive, then the goods are substitutes.



**2.c.4. Calculating Elasticity from an Equation** Suppose the demand equation is the following and we want to calculate the point elasticity of demand:

$$Q = 10 - 2P + 0.2I + 2P_x$$

Where  $Q$  is quantity demanded,  $P$  is the product price and  $P_x$  is the price of a related good, and  $I$  is income. Assume that  $P = \$10$ ,  $I = 100$ , and  $P_x = 20$ . Plug the numbers into the demand equation:

$$Q = 10 - 2(10) + 0.2(100) + 2(20) = 50$$

Now find price elasticity of demand:  $\Delta Q/\Delta P * P/Q$ .

According to the equation, whenever  $Q$  changes,  $P$  changes by (negative) twice that much.  $\Delta Q/\Delta P = -2$ . We are given that  $P = 10$ , and we solved that  $Q = 50$  when  $P = 10$ . So the price elasticity is  $-2(10/50) = -2/5$  or  $-.40$ . Demand is inelastic.

We can calculate income elasticity and cross-price elasticity of demand in essentially the same manner.

**Income elasticity** is  $\Delta Q/\Delta I * I/Q$  where  $I$  is income. Since  $Q$  changes by 0.2 whenever  $I$  changes by 1, and since  $I = 100$ , the income elasticity is  $(0.2)(100/50) = 2$ .

**Cross-price elasticity** is  $\Delta Q/\Delta P_x * P_x/Q$  where  $P_x$  is price of a related good. Since  $Q$  changes by 2 whenever  $P_x$  changes by 1, the cross-price elasticity is  $(2)(20/50) = .80$ .

Also note that you could calculate the arc elasticity by using two different prices and their associated quantities.

## RECAP

1. The cross-price elasticity of demand is the percentage change in the quantity demanded for one product divided by the percentage change in the price of a related product, everything else held constant. If the cross-price elasticity of demand is positive, the goods are substitutes. If the cross-price elasticity of demand is negative, the goods are complements.
2. The income elasticity of demand is the percentage change in the quantity demanded for one product divided by the percentage change in income, everything else held constant. If the income elasticity of a good is greater than zero, the good is called a *normal good*. If the income elasticity of a good is negative, the good is called an *inferior good*. If the income elasticity of a good is a high positive number, the good is called a *luxury good*.
3. Elasticities can be calculated for any determinant of demand. Although income and cross-price elasticities were calculated in the text, other elasticities, such as advertising, international development, service, quality, and expectations elasticities, could have been calculated for any thing that affects demand.
4. Price elasticity of demand:  $\Delta Q/\Delta P * P/Q$ .  
Cross-price elasticity is  $\Delta Q/\Delta P_x * P_x/Q$ , where  $P_x$  is price of a related good.  
Income elasticity is  $\Delta Q/\Delta I * I/Q$ , where  $I$  is income.
5. The point price elasticity of demand is the elasticity calculated at a single price and quantity. The arc price elasticity of demand is the elasticity calculated over a range of prices and associated quantities.

### 3. The Price Elasticity of Supply

The price elasticity of supply is a measure of how sellers adjust the quantity of a good or service that they offer for sale when the price of that good changes. The **price elasticity of supply** is the percentage change in the quantity supplied of a good or service divided by the percentage change in the price of that good or service, everything else held constant. The price elasticity of supply is usually a positive number because the quantity supplied typically rises when the price rises. Supply is said to be elastic over a price range if the price elasticity of supply is greater than 1 over that price range. It is said to be inelastic over a price range if the price elasticity of supply is less than 1 over that price range.



**4** How do we measure how much sellers respond to a price change?

#### price elasticity of supply

The percentage change in the quantity supplied divided by the percentage change in price, everything else held constant.

#### 3.a. Price Elasticity of Supply and the Shape of the Supply Curve

The price elasticity of supply is either zero or a positive number. A zero price elasticity of supply means that the quantity supplied will not vary as the price varies. A positive price elasticity of supply means that as the price of an item rises, the quantity supplied rises. The price elasticity of supply is zero for goods whose quantities cannot change. This is illustrated in Figure 4(a), where supply is a vertical line. Land surface, Monet paintings, Beethoven symphonies, and the Beatles' songs are all fixed in quantity. Because Monet, Beethoven, and John Lennon are dead, no matter what happens to price, the quantity of their products cannot change.

Figure 4(b) shows a perfectly elastic supply curve, a horizontal line. There are some goods for which the quantity supplied at the current price can be whatever anyone wants given sufficient time. The production of food, for instance, has increased tremendously during the past century, while the price has remained about the same. For most goods, the supply curve lies between the perfectly inelastic and perfectly elastic extremes. In Figure 4(c), two supply curves are drawn illustrating different shapes that the supply curve might have. The steeper curve,  $S_1$ , is more inelastic than curve  $S_2$ . Just as the elasticity changes along a straight-line demand curve, it also changes along a straight-line supply curve. However, the steeper curve is less elastic at every price compared to the flatter curve.

#### 3.b. The Long and Short Runs

The shape of the supply curve depends primarily on the length of time being considered. Economists view time in terms of two distinct periods, the short run and the long run. The **short run** is a period of time long enough for existing firms to change the quantity of output they produce by changing the quantities of *some* of the resources used to produce their output, but not long enough for the firms to change the quantities of *all* of those resources. In the short run, firms are not able to build new factories or retrain workers, and new firms are unable to open up shop and begin to supply goods and services. The **long run** is a period of time long enough for existing firms to change the quantities of all the resources they use and for new firms to begin producing the product. So the actual or chronological time for the short and the long run varies from industry to industry. The long run for oil refining may be as long as seven to eight years; for personal computers, perhaps a year; for basket making, probably no longer than a day or two.

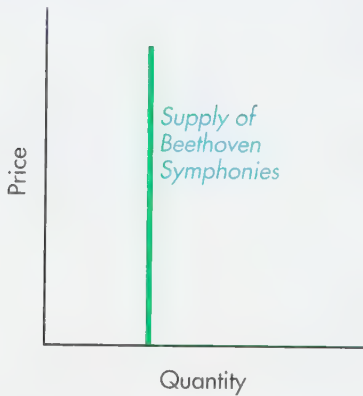
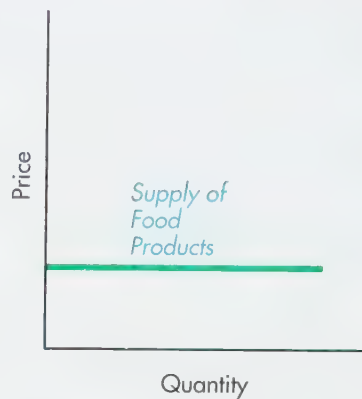
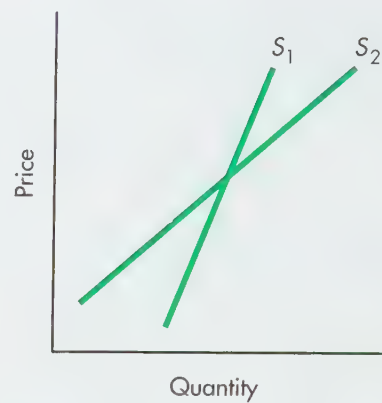
#### short run

A period of time short enough that the quantities of at least one of the resources used cannot be varied.

#### long run

A period of time long enough that the quantities of all resources can be varied.

Usually, the greater the time period allowed, the more readily firms will increase their quantities supplied in response to a price increase. Thus, supply curves applicable to shorter periods of time tend to be more inelastic than supply curves that apply to longer periods of time. A baker who can switch from producing cupcakes to producing muffins within a day has large price elasticities of supply for cupcakes and for muffins; a small increase in the price of muffins relative to that of cupcakes will cause the bakery to significantly increase the quantity of muffins baked and reduce the quantity of cupcakes baked.

**FIGURE 4** The Price Elasticity of Supply**(a) Perfectly Inelastic Supply Curve****(b) Perfectly Elastic Supply Curve****(c) Two Straight-Line Supply Curves**

There are some special types of goods for which supply cannot change no matter what the length of time allowed for change. For such goods, the price elasticity of supply is zero and the supply curve is vertical, as shown in Figure 4(a). Figure 4(b) is a perfectly elastic supply curve, a horizontal line. A perfectly elastic supply curve says that the quantity supplied at the given price is unlimited; a small—infinitesimal—price change would lead to an infinite change in quantity supplied. For most goods, the supply curve lies between the perfectly inelastic and perfectly elastic extremes. In Figure 4(c), two supply curves are drawn. Curve  $S_1$  is less elastic than curve  $S_2$ .

An automobile manufacturing plant that requires several months or years to switch from constructing one type of car to another, however, will have a relatively inelastic supply.

In Figure 4(c), supply curve  $S_1$  represents a shorter-run supply curve. For a given price change, the quantity supplied would change by a small amount, shown by moving along  $S_1$ . Curve  $S_2$  represents a longer-run supply curve.

### 3.c. Calculating Price Elasticity of Supply

The calculation of price elasticity of supply is completely analogous to the calculation of price elasticity of demand. As a result, we will just go over the point elasticity calculation. The definition of the price elasticity of supply is: Percentage change in quantity supplied divided by percentage change in price. This can be written in the familiar form:

$$\Delta Q / \Delta P \cdot P / Q$$

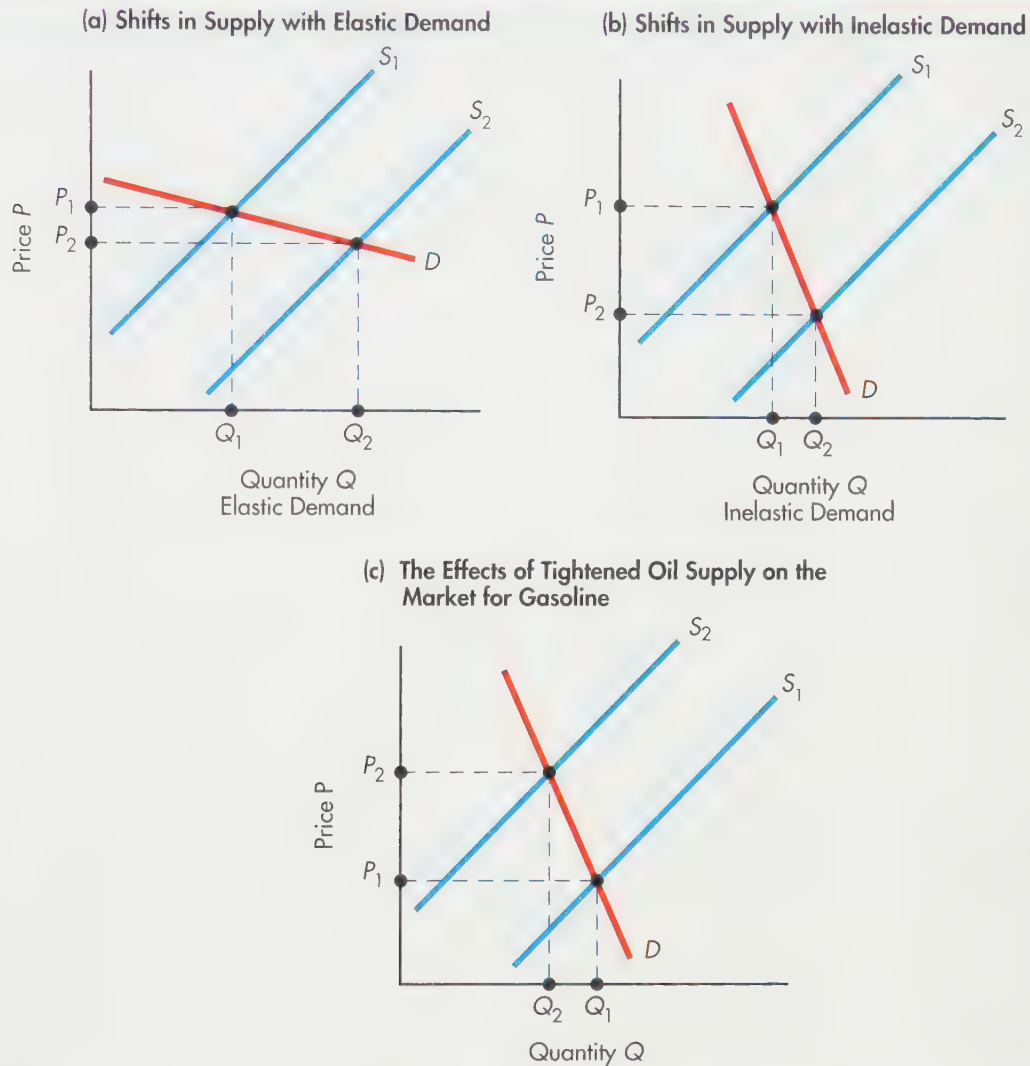
Since  $\Delta Q / \Delta P$  is positive,  $Q$  goes in the same direction as  $P$ , and  $P / Q$  is positive, the price elasticity of supply is a positive number. The higher the number, the more elastic is supply.

### 3.d. Interaction of Price Elasticities of Demand and Supply

It takes both demand and supply to determine the equilibrium price and quantity in a market. Similarly, it takes both the price elasticity of demand and the price elasticity of supply to determine the full effect of a price change. The effect on price and quantity depends on the elasticities of demand and supply. One example of how this works is shown by a supply curve shifting along a single demand curve. If demand is very elastic, then shifts in the supply curve will result in large changes in quantity demanded and small changes in price at the equilibrium point, as in Figure 5(a).

If demand is very inelastic, however, then shifts in the supply curve will result in large changes in price and small changes in quantity at the equilibrium point, as shown in Figure 5(b).



**FIGURE 5** Shifts of the Supply Curve

- (a) A shift of supply leads to a small price change and a large quantity change when demand is elastic. (b) A shift of supply, equal horizontal to the shift in Figure 5(a), leads to a much larger change in price and smaller change in quantity if demand is inelastic. (c) A reduction in the supply of gasoline leads to a large price increase without much of a change in the quantity demanded.

Shifts in one curve can have drastically different effects depending on how elastic or inelastic the other curve is. For instance, let's take a look at the market for gasoline. Because demand is relatively inelastic, at least in the short run, when the supply of oil is reduced due to natural disasters or due to the oil cartel, OPEC, the reduction in supply is illustrated by an inward shift of the supply curve and the resulting higher price and lower quantity consumed.

Why? Because consumers do not have good substitutes for driving and thus are not willing to significantly cut their gasoline consumption in the short run (meaning the demand is very inelastic in the short run). In such a case, a shift in the supply curve affects the price much more than the quantity. This means the consumer is paying the bill. If the price changed little or none, but quantity changed a lot, that would indicate that the producer/supplier is paying most of the bill.

Another example of the importance of price elasticity of demand is given by the statement that business simply passes increased costs on to the consumer. In early 2011, prices of

steel, wheat, sugar, rice, corn, and other items rose much more rapidly than they had risen during the previous few years. Businesses worried about their profits. Because consumers were still reacting to the 2008 recession, businesses avoided price increases, concerned about driving away price-conscious consumers or hoping to hold on to market share. But more and more businesses were reacting in the following way: “We can’t absorb cost increases; we’re just going to have to pass them on to the consumer.” Under what conditions can costs be passed on to the consumer? It depends on the price elasticities of demand and supply.

Suppose demand is very price-inelastic. Then when the cost to business increases—illustrated by an upward-shifting supply curve (Figure 5[c])—the cost can be shifted to the consumer in terms of higher prices without affecting sales much. Conversely, suppose demand is very price-elastic. Then cost increases (illustrated by Figure 5[a]) cannot be passed on to consumers since a small price increase would reduce sales ( $Q$ ) significantly.

**3.d.1. Who Really Pays a Tax: Tax Incidence** Both the price elasticity of supply and price elasticity of demand come into play when determining which group, buyers or sellers, pay a larger portion of taxes that are imposed on business. Often people claim that any taxes on business will be passed along to the consumer. This is only true under certain conditions, depending on both the price elasticity of demand and the price elasticity of supply. Who actually pays the tax is said to bear the **incidence** of a tax or **tax incidence**.

#### **incidence or tax incidence**

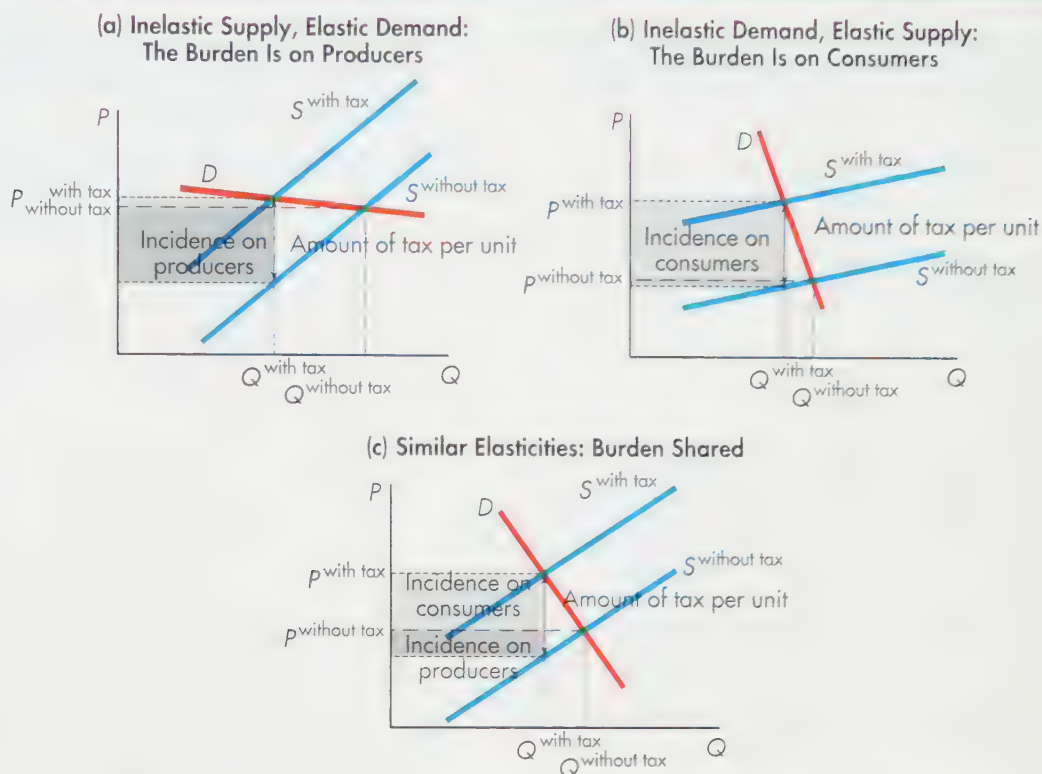
The share of a tax paid by consumers and/or producers. Who pays the larger share is said to bear the incidence of the tax.

**Inelastic supply, elastic demand** If supply is price-inelastic, the supplier will not change the quantity produced very much when the price is changed. The consumer’s demand is price-elastic, indicating that the consumer is very sensitive to price. Suppose the market is currently in the situation of  $S$  “without tax” and  $D$ . The price is  $P$  “without tax” and the quantity is  $Q$  “without tax.” Levying a tax on the producer means the producer’s costs are higher at every quantity of production; the  $S$  curve shifts up to  $S$  “after tax.” The imposition of the tax causes the market price to increase from  $P$  “without tax” to  $P$  “with tax.” The consumer reacts by significantly reducing quantity demanded so that the quantity demanded falls from  $Q$  “without tax” to  $Q$  “with tax” (Figure 6[a]). Notice that price rises very little, indicating that the producer is unable to pass the tax on to the consumer and the tax ends up being paid by the producer.

**Inelastic demand, elastic supply** When demand is price-inelastic, a large change in price will cause a smaller change in quantity demanded. With a price-elastic supply, the producer is very sensitive to price. A small drop in price leads to a large drop in the quantity produced. The imposition of the tax causes the market price to increase from  $P$  “without tax” to  $P$  “with tax” and the quantity demanded to fall from  $Q$  “without tax” to  $Q$  “with tax.” So the quantity changes very little and price a great deal following the imposition of the tax. This illustrates that the producer is able to pass almost the entire value of the tax on to the consumer. Even though the tax is being collected from the producer, it is the consumer who ends up paying it.

**Similar price elasticities** When the price elasticities of demand and supply are about the same, the burden of the tax gets shared between buyer and seller. In Figure 6(c), the tax increase shifts the supply curve upward driving price to  $P$  “with tax” from  $P$  “without tax.” Quantity adjusts to  $Q$  “with tax” from  $Q$  “without tax.” The quantity declines more in 6(c) than in 6(b), indicating that consumer demand is more elastic in 6(c) than in 6(b). It declines less in 6(a) than in 6(c), indicating that consumer demand is less elastic in 6(c) than in 6(b). So when price elasticities of supply and demand are about the same, a portion of the tax will be paid by both parties. In other words, the supplier is able to shift a portion of the tax to consumers in terms of the higher price but not as much as in 6(b).

The FICA tax, Social Security and Medicare, is imposed partly on the employer and partly on the employee. (In every year but 2011, the tax was an equal share such as 7.65% paid by employer and 7.65% paid by employee.) However, whether a larger share is actually paid by the employer or the employee will depend on the price elasticities of demand and supply for labor. In addition, how much of the tax is passed on to consumers by the employers will depend on the price elasticities of demand and supply for the good or service offered by the employer.

**FIGURE 6** Incidence of a Tax

In Figure 6(a), the incidence of a tax is shown when there is an inelastic supply and an elastic demand: the burden is on producers. When supply shifts up, reflecting increased costs, consumers react strongly by reducing the quantity demanded a great deal. As a result, producers are unable to make consumers pay for the higher taxes. In Figure 6(b), demand is inelastic and supply is elastic. Here the firm is able to shift the tax to consumers. Supply shifts up but quantity demanded changes very little. In Figure 6(c), demand and supply have similar elasticities. Here the burden of the tax is about equally shared.

## RECAP

1. The price elasticity of supply is the percentage change in the quantity supplied of one product divided by the percentage change in the price of that product, everything else held constant.
2. The price elasticity of supply increases as the time period under consideration increases.
3. The long run is a period of time just long enough that the quantities of all resources used can be varied. The short run is a period of time just short enough that the quantity of at least some of the resources used cannot be varied.
4. The interaction of demand and supply determines the price and quantity produced and sold; the relative size of demand and supply price elasticities determines how the market reacts to changes.
5. When demand is relatively more elastic than supply, then producers are unable to shift as much of a tax increase to consumers as when demand is relatively less elastic than supply.
6. How much of a tax is paid by producers or consumers is called the incidence of a tax. If producers pay a larger share, it is said that the incidence of a tax falls on producers. Similarly, if consumers pay a larger share, it is said that the incidence falls on consumers.



## SUMMARY

1. **How do we measure how much consumers alter their purchases in response to a price change?**
  - The price elasticity of demand is a measure of the responsiveness of consumers to changes in price. It is defined as the percentage change in the quantity demanded of a good divided by the percentage change in the price of the good. §1.a
  - The price elasticity of demand is always a negative number because price and quantity demanded are inversely related. §1.a
  - A straight-line demand curve is separated into three parts by the price elasticity of demand. Demand is price-elastic at the top of the curve; as you move down the curve, it becomes unit elastic and then price-inelastic. §1.b.1
  - Comparing the price elasticity of demand for various products and services allows economists to see how consumers respond to price changes. In other words, it can tell us how big a difference price makes in a particular purchasing decision. §1.c
2. **What determines whether consumers alter their purchases a little or a lot in response to a price change?**
  - Everything else held constant, the greater the number of close substitutes, the greater the price elasticity of demand. §1.d
  - Everything else held constant, the greater the proportion of a household's budget that a good constitutes, the greater the household's elasticity of demand for that good. §1.d
  - Everything else held constant, the longer the time period under consideration, the greater the price elasticity of demand. §1.d
3. **How do we measure how much changes in the determinants of demand affect consumer purchases?**
  - Elasticities can be calculated for any variable that affects demand—the determinants of demand—such as income, prices of related goods, advertising, and others. §2
  - The cross-price elasticity of demand is defined as the percentage change in the quantity demanded for one good divided by the percentage change in the price of a related good, everything else held constant. §2.a
  - When the cross-price elasticity is positive, the goods are substitutes. When it is negative, the goods are complements. §2.a
  - The income elasticity of demand is defined as the percentage change in the quantity demanded for a good divided by the percentage change in income, everything else held constant. §2.b
4. **How do we measure how much sellers respond to a price change?**
  - The price elasticity of supply is defined as the percentage change in the quantity supplied of a good divided by the percentage change in the price of that good, everything else held constant. §3
  - The short run is a period of time short enough that the quantities of at least some of the resources used in production cannot be varied. The long run is a period of time just long enough that the quantities of all resources used can be varied. §3.b

## KEY TERMS

arc elasticity, 100  
 cross-price elasticity of demand, 98  
 elasticity, 94  
 incidence, 106  
 income elasticity of demand, 99  
 inferior goods, 99

long run, 103  
 luxury good, 99  
 normal goods, 99  
 perfectly elastic demand curve, 95  
 perfectly inelastic demand curve, 95

point elasticity, 100  
 price elasticity of demand, 94  
 price elasticity of supply, 103  
 short run, 103  
 tax incidence, 106

## EXERCISES

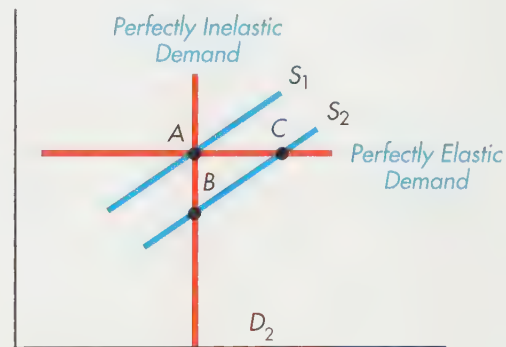
Use the following hypothetical demand schedule for movies to do exercises 1–4.

| Quantity Demanded | Price | Elasticity |
|-------------------|-------|------------|
| 100               | \$ 5  |            |
| 80                | \$10  |            |
| 60                | \$15  |            |
| 40                | \$20  |            |
| 20                | \$25  |            |
| 10                | \$30  |            |

- Determine the price elasticity of demand at each quantity demanded using the arc or midpoint formula: Percentage change in quantity demanded =  $(Q_2 - Q_1)/Q_1$  divided by percentage change in price =  $(P_2 - P_1)/P_1$ .
  - Redo exercise 1a using price changes of \$10 rather than \$5.
- Plot the price and quantity data given in the demand schedule of exercise 1. Put price on the vertical axis and quantity on the horizontal axis. Indicate the price elasticity value at each quantity demanded. Explain why the elasticity value gets smaller as you move down the demand curve.
- What would a 10 percent increase in the price of movie tickets mean for the quantity demanded of a movie theater if the price elasticity of demand was 0.1, 0.5, 1.0, and 5.0?
- Using the demand curve plotted in exercise 1, illustrate what would occur if the income elasticity of demand was 0.05 and income rose by 10 percent. If the income elasticity of demand was 3.0 and income rose by 10 percent, what would occur?
- Pick a good whose demand is price elastic. List five substitutes and five complements. Which is easier to come up with, the list of substitutes or the list of complements? Explain.
- Are the following pairs of goods substitutes or complements? Indicate whether their cross-price elasticities are negative or positive.
  - Bread and butter
  - Bread and potatoes
  - Socks and shoes
  - Tennis rackets and golf clubs
  - Bicycles and automobiles
  - Foreign investments and domestic investments
  - Cars made in Japan and cars made in the United States
- Explain how consumers will react to a job loss. What will be the first goods they will do without? What is the income elasticity of demand for those goods?
- Calculate the income elasticity of demand from the following data (use the arc or average).
 

| Income   | Quantity Demanded |
|----------|-------------------|
| \$15,000 | 20,000            |
| \$20,000 | 30,000            |

  - Explain why the value is a positive number.
  - Explain what would happen to a demand curve as income changes if the income elasticity was 2.0. Compare that outcome to the situation that would occur if the income elasticity of demand was 0.2.
- Use the figure to show what occurs to price and quantity when supply decreases and demand is perfectly elastic.
  - Use the figure to show what occurs to price and quantity when supply increases and demand is perfectly inelastic.



- Explain why a 40 percent across-the-board tax increase on businesses might harm consumers.
- The price elasticity of the demand for gasoline is  $-0.02$ . The price elasticity of demand for gasoline at Joe's 66 station is  $-1.2$ . Explain what might account for the different elasticities.
- The cross-price elasticity of the demand for cell phones and DVDs is 1.2. Explain. The cross-price elasticity of the demand for the iPod and DVDs is  $-1.4$ . Explain.
- Using the following equation for the demand for a good or service, calculate the price elasticity of

demand (using the point form), cross-price elasticity with good  $x$ , and income elasticity.

$$Q = 8 - 2P + 0.10I + P_x$$

$Q$  is quantity demanded,  $P$  is the product price, and  $P_x$  is the price of a related good, and  $I$  is income. Assume that  $P = \$10$ ,  $I = 100$ , and  $P_x = 20$ .

14. Plot the following price and quantity. Then calculate price elasticity of demand at  $P = 8$ ,  $P = 4$ , and  $P = 2$ .

| P  | Q  |
|----|----|
| 10 | 0  |
| 8  | 4  |
| 7  | 6  |
| 6  | 8  |
| 5  | 10 |
| 4  | 12 |
| 3  | 14 |
| 2  | 16 |
| 1  | 18 |

15. The FICA tax is the Social Security tax plus Medicare. It is levied on both the employer and employee. Until 2011, each paid an equal 7.65% of the employee's salary. In 2011 the share levied on the employee was reduced. Illustrate who actually pays the tax when price elasticity of demand is elastic and price elasticity of supply is inelastic.
16. Who would pay a tax imposed on the supplier when the price elasticity of supply is inelastic and the price elasticity of demand is elastic?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



## SUV SALES GET STUCK IN MUD

*Ward's Dealer Business*, February 1, 2009

**T**errible 2008 SUV sales are prompting speculation that the once-popular segment might be permanently stuck in the mud.

Overall light-vehicle sales were down 18% last year to 13.19 million units compared with 16.08 million the year before, according to Ward's data.

But SUV sales took a 39.3% plunge, going from 1.91 million units in 2007 to 1.16 million in 2008.

Middle SUVs was the biggest segment loser, with sales sinking 45% in 2008. By comparison, midsize cross/utility vehicle sales were off 6.8%.

"People are moving out of the midsize SUV market completely and going to CUVs," says Matt Traylen, senior director for Automotive Lease Guide. "What people don't want now is anything with 'SUV' in the name."

Car-based CUVs look like SUVs but offer a smoother ride and nimbler handling than SUVs built on truck platforms.

SUVs had their heyday in the 1990s and into the early years of this decade, when fuel prices were relatively low. What SUVs lacked in fuel economy they made up in bulk and roominess. They also offered off-road capability, even though few owners put them to the test.

When fuel prices spiked in 2008, reaching \$4 per gallon,

SUVs took a punch, from which they didn't recover. Among the segments hardest hit were the Hummer H3 (down 50.8%), Dodge Durango (off 52.9%), and Nissan Armada (down 50.4%).

Despite SUVs' touted ruggedness, there is an impractical side in their everyday use by most owners, Traylen says. Eighty percent of people who buy SUVs don't use them as SUVs.

"They don't go up mountains or off-roading. They take their kids to school and go to the grocery store," he says. "A lot of people are waking up and asking, 'Why did I buy this vehicle?'"

Ironically, full-size SUVs, the segment's biggest gas guzzlers, suffered its smallest 2008 sales decline, although still it was substantial at 36.2%.

"There will always be a market for big SUVs, just not as large a market as before," Traylen says, noting that the few SUV owners who actually take their vehicles off road and up mountains tend to drive the full-size models.

Because mid-size SUVs are fast becoming unpopular, it is hard to predict what their residuals will be in two to three years, Traylen says. In contrast, "mid-compact and midsize cars are stable."

His residual forecasting centers on what vehicles will be worth when they come off lease. Leasing took a hit of its own last year,

particularly when Chrysler Financial and Wells Fargo bank abandoned leasing.

"Chrysler pulling out was a bit of a body blow," Traylen says at a recent Auto Finance Summit. "But Chrysler could return to leasing in a few years, if it sorts things out. When banks leave, they're gone."

"Banks are there to make a profit from leasing, captive finance firms are there to help auto makers sell vehicles. Wells Fargo is not likely to return to leasing."

If leasing penetration gets too high, as it did during the late 1990s, it creates residual problems for auto makers and excess volume for re-marketers faced with waves of vehicles coming off lease.

"Leasing at 30% penetration is too crazy; we saw that," Traylen says. "Twenty percent is pretty healthy. It had been around that until 2008. It will probably drop to the low teens."

Smaller regional banks that know their markets may fill the leasing void created by the likes of Chrysler Financial and Wells Fargo, he says. "If any leasing growth occurs, it will be local and small."

Other predictions from Traylen:

- This year, like 2008, will be difficult, while "2010 and beyond look better."

- Resale values for luxury models will continue to decline.
- Repossessions will “continue to be problematic for high-priced segments,” hurting resale performances.
- If new-car incentives increase, it will hurt used-car sales and create a false impression of consumer interest. “If people are paying thousands of dollars less, it’s not really a demand.” But, he

adds, “U.S. consumers will not pay high prices for cars right now.”

STEVE FINLAY

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**Source:** Ward’s Dealer Business, February 1, 2009.  
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**A**fter September 11, 2001, some of the U.S. public and some of the media started a campaign against the sport utility vehicle, or SUV. American TV ads suggested that owners of gas-guzzling SUVs were indirectly assisting terrorists who obtain financing in oil-exporting Middle East countries, and a group of Christian ministers launched a “What Would Jesus Drive?” campaign, urging SUV owners to consider whether they could switch to more fuel-efficient vehicles to preserve the planet. However, while these campaigns may have changed some consumers’ tastes, the real effect on consumers’ demand for SUVs has come from the increased gas prices. The article notes that SUV sales took a 39.3% plunge, going from 1.91 million units in 2007 to 1.16 million in 2008. The reason was the rapid increase in fuel prices in 2008, reaching \$4 per gallon. SUVs took a punch, from which they didn’t recover. Among the segments hardest hit were the Hummer H3 (down 50.8%), Dodge Durango (off 52.9%), and Nissan Armada (down 50.4%).

Why have higher gas prices affected purchases of SUVs? It is the price of gasoline that has risen, not the price of SUVs. The answer is that, in the

short run, the demand for gasoline is very inelastic and the cross-price elasticity of gasoline and SUVs is negative. The demand for gasoline is price-inelastic in the short run because there are no close substitutes. When the price increases, people don’t have many alternatives to driving; they do not reduce their consumption very much. In the long run, if the price of gasoline should remain high, substitutes for gas would become available. In fact, many people immediately switched purchases from the SUVs to hybrid autos because they use less gas.

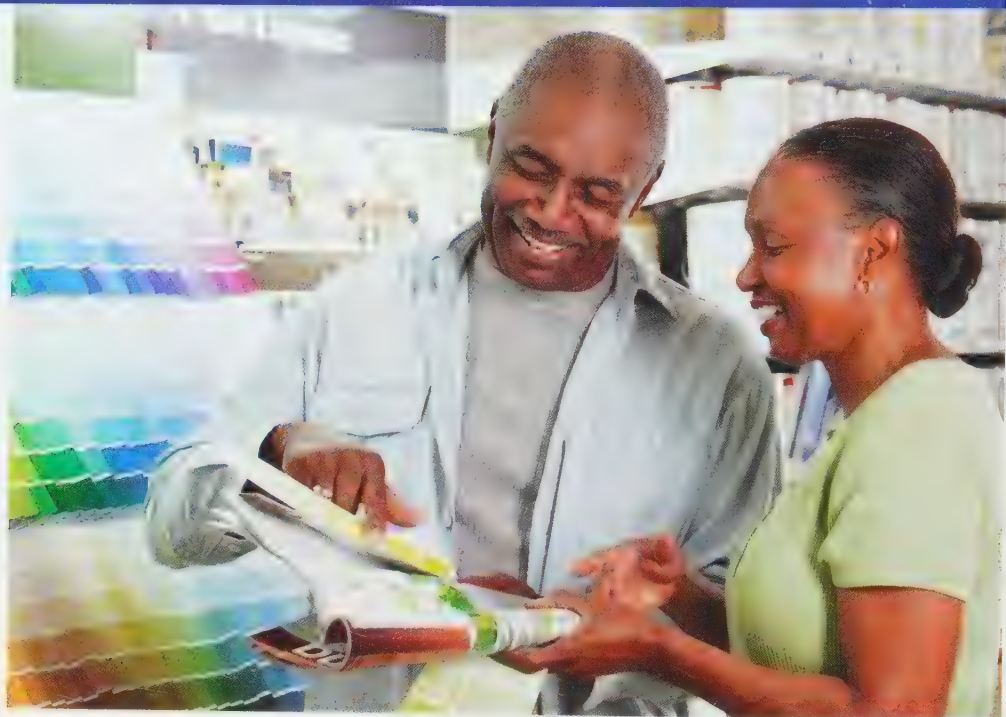
The cross-price elasticity is calculated by dividing the percentage change in the demand for SUVs by the percentage change in the price of gasoline. Gasoline prices in the United States rose from \$1.30 per gallon in January 2003 to \$1.90 per gallon in March 2003, a 46 percent increase. The price rose in 2008 to over \$4 per gallon, a more than 200 percent increase from 2003. This increase drove the sales of SUVs down more than 40%. Using these numbers, the percentage change in SUV sales divided by the percentage change in price of gasoline is:  $-40\%/200\%$  or  $-0.20$ . The cross-price elasticity is negative, indicating that the two products, SUVs and gasoline, are complements.



## CHAPTER 6

# Consumer Choice

MACIEJ FROLOW/GETTY IMAGES INC.



ARIEL SKELLEY/GETTY IMAGES; LOGO: © FROX/SHUTTERSTOCK.COM



### FUNDAMENTAL QUESTIONS

- 1 How do consumers decide what to buy?
- 2 Why does the demand curve slope down?
- 3 What are behavioral economics and neuroeconomics?

In previous chapters, we learned that demand measures the quantity of a good or service that people are willing and able to buy at various prices. In the previous chapter, we also learned how the consumer's reaction to price changes and how changes to the consumer's income affect demand. In this chapter, we go behind the scenes of demand. We examine how and why consumers make choices and what factors influence their choices. We even look briefly into their brains—what parts of the brain they use to make decisions and how that makes a difference in their behavior.

# 1. Decisions

Do we go to college or get a job? Do we get married or remain single? Do we live in the dorm, a house, or an apartment? “Decisions, decisions, decisions! Don’t we ever get a break from the pressure of making choices?” Not unless scarcity disappears will we be freed from having to make choices. Although scarcity and choice are pervasive, how people make decisions is a question that has eluded scientific explanation. Some decisions seem to be based on feelings, or to come from the heart, while others seem more calculated. Some are quick and impulsive, while others take months or years of research. Is it the appeal of the book cover that makes you decide to buy one book rather than another? Does a television commercial affect your decision? The answers to these questions depend on your values, on your personality, on where you were raised, on how others might react to your decision, and on many other factors.

Although the important factors in a decision may vary from person to person, everyone makes decisions in much the same way. People tend to compare the perceived costs and benefits of alternatives and select those that they believe will give them the greatest relative benefits.

## 1.a. Utility

How is success measured in the game of life? It is measured not in the way the bumper sticker says, “The one with the most toys at the end wins,” but by happiness. The word *happiness* is used very generally here. It implies that whatever an individual’s goals are—peace, serenity, religious devotion, self-esteem, or the well being of others—the more one has of what one desires, the better off one is. **Utility** is the term that economists and philosophers have used to capture this general concept of happiness. You are nourished by a good meal, entertained by a concert, proud of a fine car, and comforted by a nice home and warm clothing. Whatever feelings are described by *nourishment*, *entertainment*, *pride*, and *comfort* are captured in the term *utility*.

People make choices that give them the greatest utility; they maximize their utility. The utility you derive from experiencing some activity or consuming some good depends on your tastes and preferences. You may love opera and intensely dislike country and western music. You may have difficulty understanding how anyone can eat tripe, but you love hot chilies. We shall have little to say about why some people prefer country and western music and others classical music, although the issue is interesting; we simply assume that tastes and preferences are given and use those given tastes and preferences to describe the process of decision making.

### utility

A measure of the satisfaction received from possessing or consuming goods and services.

*Individuals behave so as to maximize their utility.*

## 1.b. Diminishing Marginal Utility

Utility is used to show why the law of demand is referred to as a law. To illustrate how utility maximization can be useful, we must create a hypothetical world in which we can measure the satisfaction that people receive from consuming goods and services. Suppose that a consumer named Gabrielle can listen to as much country and western music as she wishes during the course of the day. The utility, expressed as *utils*, that Gabrielle associates with each hour of listening is presented in Table 1.

Several important concepts associated with consumer choice can be observed in Table 1. First, each *additional* hour of music yields Gabrielle less satisfaction (fewer utils) than the previous hour. According to Table 1, the first hour yields 200 utils, the second yields another 98, the third another 50, the fourth another 10, and the fifth none. Each additional hour of music, until the fifth hour, adds to total utility, but Gabrielle enjoys each additional hour just a little bit less than she enjoyed the prior hour. This relationship is called **diminishing marginal utility**.

### diminishing marginal utility

The principle that the more of a good that one obtains in a specific period of time, the less the additional utility yielded by an additional unit of that good.



**TABLE 1** The Utility of Listening to Country and Western Music

| Hours of Listening<br>per Day | Utility of Each Additional Hour of Listening<br>(marginal utility) | Total Utility |
|-------------------------------|--|---------------|
| 1                             | 200  | 200           |
| 2                             | 98   | 298           |
| 3                             | 50   | 348           |
| 4                             | 10   | 358           |
| 5                             | 0  | 358           |
| 6                             | -70  | 288           |
| 7                             | -200   | 88            |

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**marginal utility**

The additional utility derived from consuming one more unit of a good or service.

**Marginal utility** is the change in total utility that occurs because one more unit of the good is consumed or acquired:

$$\text{Marginal utility} = \frac{\text{change in total utility}}{\text{change in quantity}}$$

According to the principle of diminishing marginal utility, the more of a good or service that someone consumes during a particular period of time, the less satisfaction another unit of that good or service provides that individual. Imagine yourself sitting down to a plate piled high with cake. The first piece is delicious, and the second tastes good, but not as good as the first. The fourth piece doesn't taste very good at all, and the sixth piece nearly makes you sick. Instead of satisfaction, the sixth piece of cake yields dissatisfaction, or **disutility**.

**disutility**

Dissatisfaction.

**total utility**

A measure of the total satisfaction derived from consuming a quantity of some good or service.

Notice that we are speaking of diminishing *marginal* utility, not diminishing *total* utility. **Total utility**, the measure of the total satisfaction derived from consuming a quantity of some good or service, climbs until dissatisfaction sets in. For Gabrielle, total utility rises from 200 to 298 to 348 and reaches 358 with the fourth hour of music. After the fifth hour, total utility declines. Marginal utility, however, is the additional utility gained from listening to another hour of music, and it declines from the first hour on.

To illustrate the relation between marginal and total utility, we have plotted the total utility data from Table 1 in Figure 1(a). The total utility curve rises as quantity rises until the fifth hour of listening. After five hours, the total utility curve declines. The reason total utility rises at first is that for the first four hours, each additional hour provides a little more utility. The marginal utility of the first hour is 200; the marginal utility of the second hour is 98; that of the third, 50; that of the fourth, 10; and that of the fifth, zero. By the fifth hour, total utility is  $200 + 98 + 50 + 10 + 0 = 358$ .

We have plotted marginal utility in Figure 1(b), directly below the total utility curve of Figure 1(a). Marginal utility declines with each successive unit, reaches zero, and then turns negative. As long as marginal utility is positive, total utility rises. When marginal utility becomes negative, total utility declines. Marginal utility is zero at the point where total utility is at its maximum (unit 5 in this case). Marginal utility is the slope of the total utility curve.

### 1.c. Diminishing Marginal Utility and Time

The concept of diminishing marginal utility makes sense only if we define the *period of time* during which consumption is occurring. If Gabrielle listened to the music over a period of several days, we might not observe diminishing marginal utility. But listening to the music in one 24-hour period causes Gabrielle to tire of it rather quickly. Usually, the shorter the time period, the more quickly marginal utility diminishes. Once the time



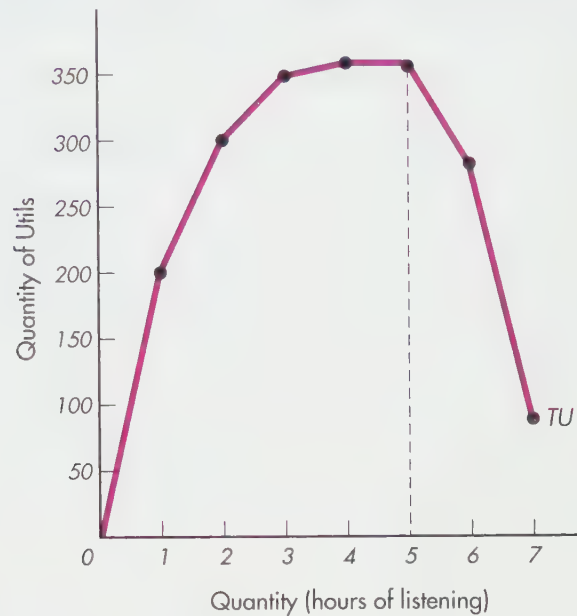
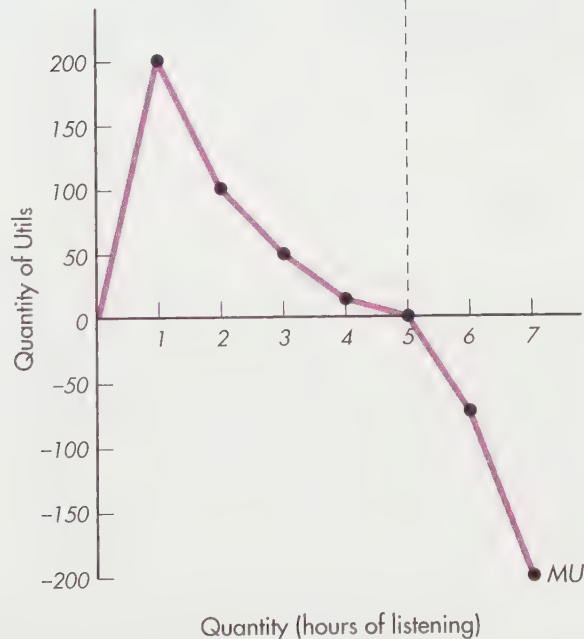
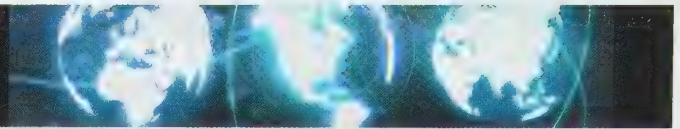
**FIGURE 1** Total and Marginal Utility**(a) Total Utility****(b) Marginal Utility**

Figure 1(a) shows the total utility obtained from listening to country and western music. Total utility reaches a maximum and then declines as additional listening becomes distasteful. For the first hour, the marginal and total utilities are the same. For the second hour, the marginal utility is the additional utility provided by the second unit. The total utility is the sum of the marginal utilities of the first and second units. The second unit provides less utility than the first unit, the third less than the second, and so on, in accordance with the law of diminishing marginal utility. But total utility, the sum of marginal utilities, rises as long as marginal utility is positive. Figure 1(b) shows marginal utility. When marginal utility is zero, total utility is at its maximum. When marginal utility is negative, total utility declines.

## ECONOMIC INSIGHT



### Does Money Buy Happiness?

Diminishing marginal utility affects consumer purchases of every good. Does diminishing marginal utility affect income as well? This question has been a topic of economic debate for years. The case for progressive taxation—the more income you have, the greater the percentage of each additional dollar that you pay in taxes—is based on the idea that the marginal utility of income diminishes. In theory, if each additional dollar brings a person less utility, the pain associated with giving up a portion of each additional dollar will decline. And as a result of taxing the rich at a higher rate than the poor, the total pain imposed on society from a tax will be less than it would be if the same tax rate were applied to every dollar.

Economists have attempted to confirm or disprove the idea of the diminishing marginal utility of income, but doing so has proved difficult. Experiments have even been carried out on the topic. In one experiment, laboratory rats were trained to work for pay. They had to hit a bar several times to get a piece of food or a drink of water. After a while, after obtaining a certain amount of food and water, the rats reduced their work effort, choosing leisure instead of more food and water. Thus, the rats reacted as if their “income”—food and water—had a diminishing marginal utility.

Economists have also turned to the literature of psychology. Psychologists have carried out many surveys to measure whether people are more or less happy under various circumstances. One survey, from the 1960s, asked people in different income brackets whether they were unhappy, pretty happy, or very happy. The results indicated that the higher income is, the happier people are. Several studies have found that, on average, people in wealthier nations are happier than people in poorer nations, but the wealthiest nation is not the happiest. Among the wealthiest nations, factors other than additional wealth are very important in explaining happiness. For instance, the longer a nation’s government has been democratic, the happier are its citizens.

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**Sources:** Bruno S. Frey and Alois Stutzer, *Happiness and Economics* (Princeton, NJ: Princeton University Press, 2002); John Stossel, “The Mystery of Happiness: Who Has It and How to Get It,” ABC News, April 15, 1996, and replayed since; David G. Myers, *The Pursuit of Happiness* (New York: William Morrow, 1992); and N. M. Bradburn and D. Caplovitz, *Reports on Happiness* (Chicago: Aldine, 1965), p. 9.

period has been defined, diminishing marginal utility will apply; it applies to everyone and to every good and service, and perhaps even to income itself, as discussed in the Economic Insight “Does Money Buy Happiness?”

#### 1.d. Consumers Are Not Identical

All consumers experience diminishing marginal utility, but the rate at which the marginal utility of any specific good or service declines is not identical for all consumers. The rate at which marginal utility diminishes depends on an individual’s tastes and preferences. Gabrielle clearly enjoys country and western music. For a person who dislikes it, the first hour might yield disutility or negative utility. Also, we cannot compare the utility that two people get from something. We can’t really say whether Bill likes the first piece of cake twice as much as Gary does. We can’t compare their utils. All we can really do is observe whether Bill and Gary eat the cake.

#### 1.e. An Illustration: “All You Can Eat”

When utility is positive, a person is happy; when utility is zero, a person receives no enjoyment. Let’s look at an activity such as eating a piece of cake. If the first piece of cake creates 5 utils, then that first piece of cake is enjoyed; if the second piece creates 3 utils, then it is enjoyed less than the first piece. When a piece of cake has 0 utils or has a marginal utility of zero, then that piece is not enjoyed. People stop eating when marginal utility is zero.

Why would a restaurant ever have a policy of “all you can eat”? Won’t people run the restaurant into the ground? No. The restaurant understands the concept of diminishing marginal utility. So it charges you a price for entering the restaurant and tells you that you can eat as much as you want—but you cannot have a “doggy bag.” All consumers eventually stop eating—their marginal utility falls to zero. This is the point at which one more bite would be distasteful. The restaurant knows that everyone is limited in the amount he or she eats.

## RECAP

1. Utility is a concept used to represent the degree to which goods and services satisfy wants.
2. Total utility is the total satisfaction that a consumer obtains from consuming a particular good or service.
3. Marginal utility is the utility that an additional unit of a good or service yields.
4. Total utility increases until dissatisfaction sets in. When another unit of a good would yield disutility, the consumer has been filled up with the good—more of it will not bring greater satisfaction.
5. According to the principle of diminishing marginal utility, marginal utility declines with each additional unit of a good or service that the consumer obtains. When marginal utility is zero, total utility is at its maximum.

## 2. Utility and Choice

Can we simply conclude that people will consume goods until the marginal utility of each good is zero? No, we cannot, for if we did so, we would be ignoring scarcity and opportunity costs. No one has enough income to purchase everything until the marginal utility of each item is zero. Because incomes are limited, purchasing one thing means not purchasing other things. Gabrielle, our country and western music fancier, might be able to get more utility by purchasing some other good than by buying more music to listen to.



**1** How do consumers decide what to buy?

### 2.a. Consumer Choice

If you have \$10 in your pocket to spend, you will spend it on the item or activity that gives you the most enjoyment—the greatest utility. Moreover, you may not spend all of it on just one thing. Suppose that with that \$10 you are considering purchasing a CD, putting some gas in your car, and going to a movie. What will you decide? Well, you will purchase the amount of each that will give you the most enjoyment.

Although we don’t go through an elaborate series of calculations when we decide to buy something, we act *as if* we did. We stand in line to purchase a \$4 Starbucks latte at 10 A.M. because we need a little kick. We could have spent that \$4 on a lot of other things, but at that moment, the latte seemed to give us the greatest satisfaction—the greatest utility. In the following long example, we go through the decision-making process as if the individual were a computer. The goal of this example is to show that people choose what to purchase with their limited budgets or incomes by comparing items to see which gives the most utility. If I am to spend another dollar, I will spend it to make myself as happy as that dollar can.

So let’s turn again to Gabrielle. Gabrielle has \$10 to spend on CDs, gasoline, and movies. She has found a place that sells used CDs, a gas station with low prices, and a movie theater that sells matinee tickets cheap. We want to know how many units of each she will purchase. The answer is in Table 2.



**TABLE 2** The Logic of Consumer Choice

| CD ( $P = \$2$ ) |      |      | Gas ( $P = \$1$ ) |      |      | Movie ( $P = \$3$ ) |     |      |
|------------------|------|------|-------------------|------|------|---------------------|-----|------|
| Units            | MU   | MU/P | Units             | MU   | MU/P | Units               | MU  | MU/P |
| 1                | 200  | 100  | 1                 | 200  | 200  | 1                   | 150 | 50   |
| 2                | 98   | 49   | 2                 | 150  | 150  | 2                   | 90  | 30   |
| 3                | 50   | 25   | 3                 | 50   | 50   | 3                   | 60  | 20   |
| 4                | 10   | 5    | 4                 | 30   | 30   | 4                   | 30  | 10   |
| 5                | 0    | 0    | 5                 | 0    | 0    | 5                   | 9   | 3    |
| 6                | -70  | -35  | 6                 | -300 | -300 | 6                   | 0   | 0    |
| 7                | -200 | -100 | 7                 | -700 | -700 | 7                   | -6  | -2   |

| Steps        | Choices    |              | Decision | Remaining          |
|--------------|------------|--------------|----------|--------------------|
| 1st purchase | 1st CD:    | $MU/P = 100$ | Gas      | $\$10 - \$1 = \$9$ |
|              | 1st movie: | $MU/P = 50$  |          |                    |
|              | 1st gas:   | $MU/P = 200$ |          |                    |
| 2nd purchase | 1st CD:    | $MU/P = 100$ | Gas      | $\$9 - \$1 = \$8$  |
|              | 2nd gas:   | $MU/P = 150$ |          |                    |
|              | 1st movie: | $MU/P = 50$  |          |                    |
| 3rd purchase | 1st CD:    | $MU/P = 100$ | CD       | $\$8 - \$2 = \$6$  |
|              | 3rd gas:   | $MU/P = 50$  |          |                    |
|              | 1st movie: | $MU/P = 50$  |          |                    |
| 4th purchase | 2nd CD:    | $MU/P = 49$  | Gas      | $\$6 - \$1 = \$5$  |
|              | 3rd gas:   | $MU/P = 50$  |          |                    |
|              | 1st movie: | $MU/P = 50$  |          |                    |
| 5th purchase | 2nd CD:    | $MU/P = 49$  | Movie    | $\$5 - \$3 = \$2$  |
|              | 4th gas:   | $MU/P = 30$  |          |                    |
|              | 1st movie: | $MU/P = 50$  |          |                    |
| 6th purchase | 2nd CD:    | $MU/P = 49$  | CD       | $\$2 - \$2 = 0$    |
|              | 4th gas:   | $MU/P = 30$  |          |                    |
|              | 2nd movie: | $MU/P = 30$  |          |                    |

**Note:** Purchases made with \$10: 2 CDs, 3 gallons of gas, and 1 movie ticket.

The price ( $P$ ) of each secondhand CD is \$2; the price of each gallon of gas is \$1; the price of each movie is \$3. The marginal utility ( $MU$ ) provided by each unit and the ratio of the marginal utility to the price ( $MU/P$ ) are presented at the top of the table. In the lower part of the table are the steps involved in allocating income among the three goods.

The first purchase involves a choice among the first unit of each of the three goods. The first CD yields a marginal utility ( $MU$ ) of 200 and costs \$2; thus, per dollar of expenditure, the first CD yields 100 utils ( $MU/P = 100$ ). The first gallon of gas yields a marginal utility per dollar of expenditure of 200. The first movie yields a marginal utility per dollar of expenditure of 50; it yields 150 utils and costs \$3. Which does Gabrielle choose?

To find the answer, compare the marginal utility per dollar of expenditure ( $MU/P$ ) for each good, *not* the marginal utility ( $MU$ ). The ratio of marginal utility to price puts the goods on the same basis (utility per dollar) and allows us to make sense of Gabrielle's decisions. Looking only at marginal utilities would not do this. For instance, another diamond might yield 10,000 utils and another apple might yield only 100 utils; but if the diamond costs \$100,000 and the apple costs \$1, the marginal utility per dollar of expenditure on the apple is greater than the marginal utility per dollar of expenditure on the diamond, and thus a consumer is better off purchasing the apple.

As indicated in Table 2, Gabrielle's first purchase is the gallon of gas. It yields the greatest marginal utility per dollar of expenditure (she needs gas in her car to be able to go anywhere). Because it costs \$1, Gabrielle has \$9 left to spend.

The second purchase involves a choice among the first CD, the second gallon of gas, and the first movie. The ratios of marginal utility per dollar of expenditure are 100 for the CD, 150 for the gas, and 50 for a movie. Thus, Gabrielle purchases a second gallon of gas and has \$8 left.

For the third purchase, Gabrielle must decide between the first CD, the first movie, and the third gallon of gas. Because the CD yields a ratio of 100 and both the gas and the movie yield ratios of 50, she purchases the CD. The CD costs \$2, so she has \$6 left to spend.

A utility-maximizing consumer like Gabrielle always chooses the purchase that yields the greatest marginal utility per dollar of expenditure. If two goods offer the same marginal utility per dollar of expenditure, the consumer will be indifferent between the two—that is, the consumer won't care which is chosen. For example, Table 2 indicates that for the fourth purchase, either another gallon of gas or a movie would yield 50 utils per dollar. Gabrielle is completely indifferent between the two and so arbitrarily selects gas. The movie is chosen for the fifth purchase. With the sixth purchase, a second CD, the total budget is spent. For \$10, Gabrielle ends up with 2 CDs, 3 gallons of gas, and 1 movie.

In this example, Gabrielle is portrayed as a methodical, robot-like consumer who calculates how to allocate her scarce income among goods and services in a way that ensures that each additional dollar of expenditure yields the greatest marginal utility. This picture is more than a little far-fetched, but it does describe the result, if not the process, of consumer choice. People do have to decide which goods and services to purchase with their limited incomes, and people do select the options that give them the greatest utility.

## 2.b. Consumer Equilibrium

With \$10, Gabrielle purchases 2 CDs, 3 gallons of gas, and 1 movie ticket. For the second CD, the marginal utility per dollar of expenditure is 49; for the third gallon of gas, it is 50; and for the first movie, it is 50. Is it merely a fluke that the marginal utility per dollar of expenditure ratios are nearly equal? No. *In order to maximize utility, consumers must allocate their limited incomes among goods and services in such a way that the marginal utility per dollar of expenditure on the last unit of each good purchased will be as nearly equal as possible.* This is called the **equimarginal principle** and also represents **consumer equilibrium**. It is consumer equilibrium because the consumer will not change from this point unless something changes income, marginal utility, or price.

In our example, the ratios at consumer equilibrium are as close to equal as possible—49, 50, and 50—but they are not identical because Gabrielle (like all consumers) had to purchase whole portions of the goods. Consumers cannot spend a dollar on any good or service and always get the fractional amount that a dollar buys—one-tenth of a tennis lesson or one-third of a bottle of water. Instead, consumers have to purchase

### equimarginal principle or consumer equilibrium

To maximize utility, consumers must allocate their scarce incomes among goods in such a way as to equate the marginal utility per dollar of expenditure on the last unit of each good purchased.

goods and services in whole units—1 piece or 1 ounce or 1 package—and pay the per unit price.

The equimarginal principle is simply common sense. If consumers have money to spend, they will spend it on those things that give them the most satisfaction. If you have a choice of A or B and A makes you happier, you will take A. At the prices given in Table 2, with an income of \$10, and with the marginal utilities given, Gabrielle maximizes her utility by purchasing 2 CDs, 3 gallons of gas, and 1 movie ticket. Everything else held constant, no other allocation of the \$10 would yield Gabrielle more utility.

Consumers are in equilibrium when they have no incentive to change what they buy—to reallocate their limited budget or income. With  $MU$  standing for marginal utility and  $P$  for price, the general rule for consumer equilibrium is  $MU_x/P_x = MU_y/P_y = MU_z/P_z$ .

## RECAP

1. To maximize utility, consumers must allocate their limited incomes in such a way that the marginal utility per dollar obtained from the last unit consumed is equal for all goods and services; this is the equimarginal principle.
2. As long as the marginal utility per dollar obtained from the last unit of all products consumed is the same, the consumer is in equilibrium and will not reallocate income.
3. Consumer equilibrium, or utility maximization, is summarized by a formula that equates the marginal utility per dollar of expenditure on the last item purchased of all goods:  $MU_a/P_a = MU_b/P_b = MU_c/P_c = MU_x/P_x$ .



- 2 Why does the demand curve slope down?

*The demand curve or schedule can be derived from consumer equilibrium by altering the price of one good or service.*

## 3. The Demand Curve Again

We have shown how consumers make choices—by allocating their scarce incomes among goods in order to maximize their utility. These choices define a demand curve.

### 3.a. The Downward Slope of the Demand Curve

Recall that as the price of a good falls, the quantity demanded of that good rises. This inverse relation between price and quantity demanded arises from diminishing marginal utility and consumer equilibrium.

Consumers allocate their income among goods and services in order to maximize their utility. A consumer is in equilibrium (has no reason to change) when the total budget has been spent and the marginal utility per dollar of expenditure on the last unit of each good is the same. A change in the price of one good will disturb the consumer's equilibrium; the marginal utilities per dollar of expenditure for the last unit of each good will no longer be equal. The consumer will then reallocate her income among the goods in order to increase total utility.

In the example presented in Table 2, the price of a CD is \$2, the price per gallon of gas is \$1, and the price of a movie ticket is \$3. Now suppose the price of the CD falls to \$1 while the prices of gas and movies and Gabrielle's budget of \$10 remain the same. Common sense tells us that Gabrielle will probably alter the quantities purchased by buying more CDs. To find out if she does—and whether the equimarginal principle holds—her purchases can be traced step by step as we did previously.



**TABLE 3** A Price Change

| CD ( $P = \$1$ ) |      |      | Gas ( $P = \$1$ ) |      |      | Movie ( $P = \$3$ ) |     |      |
|------------------|------|------|-------------------|------|------|---------------------|-----|------|
| Units            | MU   | MU/P | Units             | MU   | MU/P | Units               | MU  | MU/P |
| 1                | 200  | 200  | 1                 | 200  | 200  | 1                   | 150 | 50   |
| 2                | 98   | 98   | 2                 | 150  | 150  | 2                   | 90  | 30   |
| 3                | 50   | 50   | 3                 | 50   | 50   | 3                   | 60  | 20   |
| 4                | 10   | 10   | 4                 | 30   | 30   | 4                   | 30  | 10   |
| 5                | 0    | 0    | 5                 | 0    | 0    | 5                   | 9   | 3    |
| 6                | -71  | -70  | 6                 | -300 | -300 | 6                   | 0   | 0    |
| 7                | -200 | -200 | 7                 | -700 | -700 | 7                   | -6  | -2   |

In Table 3, only the  $MU/P$  ratio for CDs is different from the corresponding figure at the top of Table 2. At the old consumer equilibrium of 2 CDs, 3 gallons of gas, and 1 movie, the marginal utility per dollar of expenditure ( $MU/P$ ) on each good is

$$\text{CD: } 98/\$1 = 98/\$1$$

$$\text{Gas: } 50/\$1 = 50/\$1$$

$$\text{Movie: } 150/\$3 = 50/\$1$$

Clearly, the ratios are no longer equal. In order to maximize utility, Gabrielle must reallocate her budget among the goods. When all \$10 is spent, Gabrielle finds that she has purchased 3 CDs, 4 gallons of gas, and 1 movie ticket. The lower price of CDs has induced her to purchase an additional CD. Gabrielle's behavior illustrates what you already know: The quantity demanded of CDs increases as the price of the CD decreases.

If the price of the CD is increased to \$3, we find that Gabrielle demands only 1 CD. The three prices and the corresponding quantities of CDs purchased give us Gabrielle's demand for CDs, which is shown in Figure 2. At \$3 she is willing and able to buy 1 CD; at \$2 she is willing and able to buy 2 CDs; and at \$1 she is willing and able to buy 3 CDs.

### 3.b. Shifts of Demand and the Determination of Market Demand

Individual demand comes from utility maximization. Individuals allocate their scarce incomes among goods in order to get the greatest utility; this occurs when consumer equilibrium is reached, represented in symbols as  $MU_x/P_x = MU_y/P_y = MU_z/P_z$ . When the price of a good or service is changed, consumer equilibrium is disturbed. In response to the price change, individuals alter their purchases so as to achieve maximum utility.

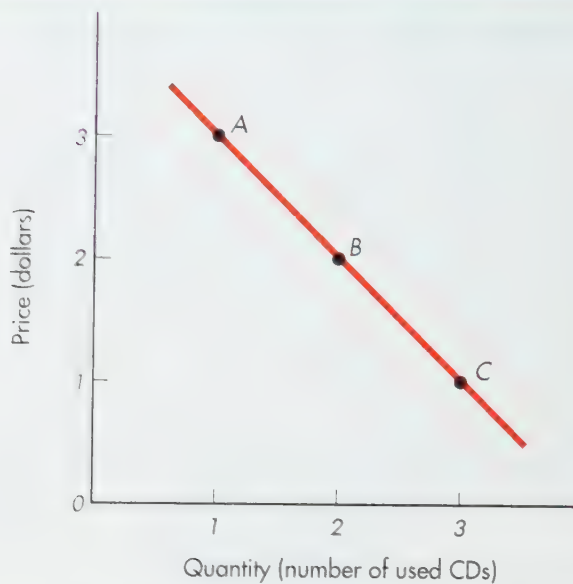
When the price of one good falls while everything else is held constant, two things occur: (1) other goods become relatively *more* expensive, so consumers buy more of the less expensive good and less of the more expensive goods, and (2) the good purchased prior to the price change now costs less, so the consumer can buy more of all goods.

When a good becomes relatively less expensive, it yields more satisfaction per dollar than before, so consumers buy more of it than before as they decrease their expenditures on other goods. This is the *substitution effect* of a price change.

Figure 2 shows that at the price of \$2 per used CD, Gabrielle spends \$4 on CDs. When the price falls to \$1, she spends only \$2 for those two CDs. As a result, Gabrielle can purchase more of all goods, including the good whose price has fallen. This is the *income effect* of a price change. The substitution effect of a price change says that

*The substitution effect indicates that following a decrease in the price of a good or service, an individual will purchase more of the now less expensive good and less of other goods.*

*The income effect of a price change indicates that an individual's income can buy more of all goods when the price of one good declines, everything else held constant.*

**FIGURE 2** Consumer Surplus and the Demand for Used CDs

**Gabrielle's Demand Curve for Used CDs.** The demand curve shows that Gabrielle purchases 1 used CD at a price of \$3, 2 used CDs at a price of \$2, and 3 used CDs at a price of \$1.

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consumers will purchase less of more expensive goods and more of less expensive goods. The income effect of a price change says consumers will purchase more of all goods when the price of a good decreases because the consumer's purchasing power has risen. Notice that the substitution and income effects reinforce the relationship between the price of an item and the quantity demanded for that item. Both tell us that when the price of one good or service declines, everything else held constant, the quantity demanded of that item will rise.

Suppose the two effects went in opposite directions; for instance, a lower price led to more purchasing power or income and that this caused the consumer to purchase less of the good. In such a case, whether the quantity demanded would rise or fall would depend on whether the substitution effect was smaller or larger than the income effect. In the Economic Insight "Does Money Buy Happiness?", it is argued that there is some income level at which the income and substitution effects go in opposite directions. As a person's wage/salary rises, the person's opportunity cost of taking more time for family and leisure rises. In other words, saying that wages rise is the same as saying that the price of leisure rises. At some high wage, receiving a slightly higher wage might induce the person to actually work less—taking more personal time. In this case, the income effect leads to less time devoted to working while the substitution effect still leads the person to work more.

The process of changing the price of one good or service while income, tastes and preferences, and the prices of related goods are held constant defines the individual's demand for that good or service. Should income, tastes and preferences, or prices of related goods and services change, then the individual's demand will change. More or less income means that more or less goods and services can be purchased. A change in income affects the ratios of  $MU/P$  and disturbs consumer equilibrium. When the price of a related good changes, the ratio of marginal utility to price for that good changes, thus disturbing consumer equilibrium. And changes in tastes and preferences,



Halloween has changed from a child's holiday to the second most popular holiday in the United States. Spending on Halloween supplies exceeds spending for every holiday except Christmas. The increased tastes for Halloween fun have led to an increased demand for costumes. In terms of economic theory, marginal utility for each dollar of spending on Halloween costumes has risen.

represented as changes in the  $MU$ s, also alter consumer equilibrium. For each change in a determinant of demand, a new demand curve for a good or service is derived; the demand curve shifts.

The market demand curve is the sum of all the individual demand curves. This means that anything that affects the individual curves also affects the market curve. In addition, when we combine the individual demand curves into a market demand curve, the number of individuals to be combined determines the position of the market demand curve. Changes in the number of consumers alter the market demand curve. We thus say that the determinants of demand are tastes and preferences, income, prices of related goods, international effects, and number of consumers. Also, recall that diminishing marginal utility is defined for consumption during a specific period of time. Since consumer equilibrium and thus the demand curve depend on diminishing marginal utility, the demand curve is also defined for consumption over a specific period of time. Changes in the time period or changes in expectations will therefore also alter demand.

## RECAP

1. The principle of diminishing marginal utility and the equimarginal principle account for the inverse relation between the price of a product and the quantity demanded.
2. A price change triggers both the substitution effect and the income effect.
3. The substitution effect occurs because once a good becomes less expensive, it yields more satisfaction per dollar than before and consumers buy more of it than before. They do this by decreasing their purchases of other goods. The income effect of the price change occurs because a lower price raises real income (total utility) and the consumer purchases more of all goods.



4. The market demand curve is the summation of all individual demand curves.
5. Economists derive the market demand curve for a good by assuming that individual incomes are fixed, that the prices of all goods except the one in question are constant, that each individual's tastes

remain fixed, that expectations do not change, that the number of consumers is constant, and that the time period under consideration remains unchanged. A change in any one of these determinants causes the demand curve to shift.

## 4. Behavioral Economics and Neuroeconomics



### 3 What are behavioral economics and neuroeconomics?

#### bounded rationality

The understanding that perfect information is not likely to be available, and that as a result people make decisions that in hindsight look irrational, but in reality are the rational results of a brain that is economizing.

#### behavioral economics

The study of decision making assuming that people are rational in a broad sense.

Economists generally assume that people are rational—that they compare costs and benefits before undertaking any action. This assumption makes humans seem more like robots than like thinking, feeling beings. In recent years, two fields of study—behavioral economics and neuroeconomics—have attempted to change this assumption.

### 4.a. Behavioral Economics

Strict rationality assumes that the decision maker has complete or perfect information. **Bounded rationality** admits that complete and perfect information is not likely to be available, and that as a result, people make decisions that in hindsight look irrational, but in reality are the rational results of a brain that is economizing—finding shortcuts and easier ways to make decisions. **Behavioral economics** attempts to catalogue the biases that result from bounded rationality. Let's look at some well-documented behaviors and explore the interplay of emotions and logic in decision making.

**4.a.1. Overconfidence** People tend to think that they *are* better and *do things* better than is really the case. For example, 100 percent of drivers say that they are in the top 30 percent of safe drivers; 68 percent of lawyers in civil cases believe that their side will prevail; 81 percent of new business owners think that their own business has at least a 70 percent chance of success, but only 39 percent think that any business like theirs would be likely to succeed. And consider this: Mutual fund managers, analysts, and business executives at a conference were asked to write down how much money they would have at retirement and how much the average person in the room would have. The average figures were \$5 million and \$2.6 million, respectively.

Making a decision—any decision—requires a certain amount of confidence in our understanding of the risks and benefits. But overconfidence and the illusion of control can add up to bad decisions and big losses. People prefer to drive rather than fly because they feel safer driving, even though the record confirms that flying is significantly safer. Similarly, people start new businesses even when the odds are against them. The U.S. Census Bureau reports that 50 percent of new ventures close within the first four years.

Overconfident chief executive officers (CEOs, or corporate bosses) provide prime examples. The top executives of Enron Corporation seemed to think that they could do and get away with just about anything. The result was the failure of the company. Tyco's former chief executive, Dennis Kozlowski, saw that the company was doing poorly, but denied it, and, rather than readjust to the situation, did things that appeared to be and were fraudulent.

You might think that experience would lead people to become more realistic about their capabilities. But research indicates that overconfidence does not decline over time,

perhaps because people generally remember failures very differently from successes. The typical view is that one's successes are due to one's own wisdom and ability, while one's failures are due to forces beyond one's control. Thus, people believe that with a little better luck or fine-tuning, the outcome will be much better next time.

**4.a.2. Mental Accounting** A dollar is a dollar is a dollar—at least, that is the way economists tend to view assets. It should not matter whether that dollar comes from the right pocket or the left pocket. The term *mental accounting* refers to the idea that the value people place on money depends on where that money comes from. For instance, people tend to spend money received as gifts or through contests more readily than money they've earned, and people tend to continue gambling with winnings even though they would not continue gambling with money that they earned.

A story about a honeymooning couple in Las Vegas provides an illustration of mental accounting. Knowing that they were headed for Las Vegas, and knowing that they did not have a lot of money, the couple decided that they would spend only a certain amount. Once that was gone, they had to return home. After a few days, the amount had been spent, and the couple was spending their last night in their hotel prior to returning home. The wife was asleep, and the husband, wide awake, noticed a \$5 chip that they had saved as a souvenir. Strangely, the number 12 was flashing in the groom's mind. Taking this as an omen, he rushed to the roulette tables, where he placed the \$5 chip on the 12; sure enough, the winner was 12, paying 35 to 1. He let the winnings ride and kept on winning until he had won \$262 million. He then let it ride once more and lost everything. Broke and dejected, he walked back to his room. "Where were you?" asked his bride. "Playing roulette," he responded. "How did you do?" she asked. "Not bad. I lost five dollars."

This story captures what is referred to as *playing with the house's money*. The idea is that people do not feel that something really belongs to them unless it comes out of their own pocket.

It is more painful to give up something that you possess than it is pleasurable to acquire the exact same thing when you don't already possess it. This means that the price elasticity of demand can be changed—made less elastic—if consumers feel that they own the product. The purchase decision can be influenced by having the buyers assume ownership, even temporarily, prior to purchase. If buyers can be persuaded to take the product home to try it out, they will be reluctant to return it when payment is due, since this will require that they incur a loss. A frequent tactic of home decoration and furniture stores is to encourage customers to take a piece of furniture or a carpet home to "see how it looks." This is also the approach of buy-now, pay-later plans. During holidays, for example, retailers frequently offer installment plans that delay payment for 90 days, so that buyers can integrate the new purchases into their reference points. Health clubs, fitness centers, and weight loss clinics offer an initial trial membership either free or at nominal rates.

Publisher's Clearing House addresses individuals who receive its direct mail promotion as "finalists" and warns them that they are about to lose millions of dollars if they do not return the winning number. Publisher's Clearing House is attempting to give consumers the impression that they possess an asset—the opportunity to win millions of dollars—that they will have to give up if they don't submit the entry form.

**4.a.3. Status Quo** In general, people would rather leave things as they are. Once something is the status quo, people don't like to change it; they value the status quo or consider the costs of change too high. For example, if people receive an inheritance of low-risk, low-return bonds, they typically don't change anything. Similarly, if people receive higher-risk securities, they also leave most of the money alone. One explanation

for this bias toward the status quo is aversion to loss—people are more concerned about the risk of loss than they are excited by the prospect of gain. If you switch your money from the stock market to housing, you would feel worse if the stock market increases than you would feel good if the housing market increases.

**4.a.4. Loss Aversion and Framing** People don't react the same way to equal-sized gains and losses. For instance, if people have come to expect the price of a gallon of gasoline to be \$2, a price of \$3 is a loss of \$1 rather than a loss of \$3, and a price of \$1 is a gain of \$1. The gain and loss are calculated relative to a reference. People tend to create references for most things, not just prices. Moreover, although the gain and loss are the same, \$1, people do not react to them in the same way. People dislike losses more than they like gains.

Framing—that is, the context in which a choice is presented—is important to the decision maker. For instance, when a customer calls a hotel for a reservation, the hotel reservationists generally quote their highest room rates, those that they charge during peak demand periods, and then discount those rates. This is an attempt to create a high reference price for the consumer. If the initially stated high price is the buyer's reference, then the buyer looks on the price actually paid as a gain. Similarly, airline reservationists initially quote the highest fare on a route before quoting discounts and associated travel restrictions. In written advertisements or in advertisements on radio, both hotels and airlines provide the lowest price along with a reference to which they want consumers to compare the advertised price. Statements like “this fare is 50 percent below previous fares” and “friends fly free,” suggesting a 50 percent discount, are common in advertisements.

Some sense of fairness is important to most people. People will reject something that they perceive as not being fair and will react strongly when they feel that they are being taken advantage of. During a snowstorm, does the local hardware store raise the price of snow shovels? During a hurricane, do grocery stores raise the price of food and water? Not if they want to retain business. The old saying is: “If you gouge them at Christmas, they won't be back in March.”

**4.a.5. Familiarity** When people must make decisions without having perfect information, they often use things that they are familiar with more than economic theory would seem to suggest. Familiarity leads to decisions that might appear irrational because people are more comfortable with a familiar situation than an unfamiliar one. Consider the following quiz:

1. In four pages of a typical novel (about 2,000 words), how many words would you expect to find that have the form “\_ \_ \_ ing” (a seven-letter word that ends in *-ing*)?
2. Now, how many words would you expect to find that have the form “\_ \_ \_ \_ n \_” (a seven-letter word with an *n* in the sixth position)?

You may have noticed that the second option includes the first—in other words, the answer to the second has to be larger than the answer to the first. Yet, because people are familiar with words that end in *-ing*, they tend to think that these words are likely to appear more often.

This reliance on familiarity also arises in answers to questions such as: “Which is more common in New York City, murder or suicide?” Although suicide is much more prevalent than murder, many people think the answer is murder. The point is that the more familiar people are with something (here, news reports of murders in New York), the more likely they are to choose it.

People generally want more for less, but the framing of “more” and “less” makes a difference. Consider how people respond to the following situation.



Who is happier: Person A, who wins the office football pool for \$100 on the same day she ruins the carpet in her apartment and must pay her landlord \$75, or Person B, who wins the office football pool for \$25?

Most people believe that Person A is happier, even though both A and B end up with the same \$25 gain. Consider the same problem with a slight revision.

Who is happier: Person A, who ruins the carpet in her apartment and must pay the landlord \$100, or Person B, who wins the office football pool for \$25 but also ruins the carpet in his apartment and must pay the landlord \$125?

In this case, most people believe that Person B is happier, even though A and B must pay the same amount, \$100. If the net result involves a gain, people prefer to have the results of the actions presented separately—a \$100 gain and a \$25 loss rather than a \$75 gain. But if the net result involves losses, people prefer to have the losses integrated or shown just once.

**4.a.6. Anchoring** Ask a group of people to write down the last three digits of their phone number, and then ask them to estimate the date of Genghis Khan's death. Time and again, the results show a correlation between the two numbers; people assume that he lived in the first millennium, when in fact he lived from 1162 to 1227. Here is another quiz:

You have five seconds to estimate the value of  $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$ .

Now, take five seconds to do the same for  $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$ .

Typically, most people believe that the results of these two exercises are different—that the result of the first is smaller than the result of the second. The reason is that the guesstimates are “anchored” to the early numbers. In the first exercise, the early numbers are smaller; in the second, the higher numbers are listed first. (Still, few guessed that the product was anywhere near the correct number of 40,320.)

**4.a.7. Sunk Costs** You and a friend are on the way to a concert for which you purchased tickets for \$100, and the tickets are not refundable. Neither of you is feeling particularly well; both of you think that it would be more fun to simply loaf around in the apartment. Your friend says, “It’s too bad we’ve already purchased the tickets, because if we don’t go, we waste \$100.” You agree. Do you go to the concert, or do you go home?

This problem illustrates the sunk-cost effect, otherwise known as “throwing good money after bad.” When we have put effort into something, we are often reluctant to pull out because of the loss that we will suffer, even if continued refusal to jump ship will lead to even more loss. Think about the \$100 tickets again and consider the issue another way. The moment you paid \$100 for the ticket, your net assets decreased by \$100. That decrease occurred several days before the concert. Is the fact that your net assets have decreased by \$100 sufficient reason for deciding to spend the night at a place you don’t want to be? The \$100 *you have already paid* is technically termed a *sunk cost*. Rationally, sunk costs *should not affect decisions about the future*. Sunk means that they are gone—they are not recoverable. The \$100 is gone whether you go to the concert or not. So, why choose to do something that you would prefer not to do just because you have already bought tickets? The tendency to do so is the sunk-cost effect.

Executives making strategic investment decisions can also fall into the sunk-cost trap. When large projects overrun their schedules and budgets, the original economic case no longer holds. The project should be abandoned. However, because so much has already been spent, companies keep spending to complete such projects.

Now that we've taken a brief look at how emotions affect economic decisions, let's examine the ways in which biology affects decision making.

## 4.b. Neuroeconomics

### neuroeconomics

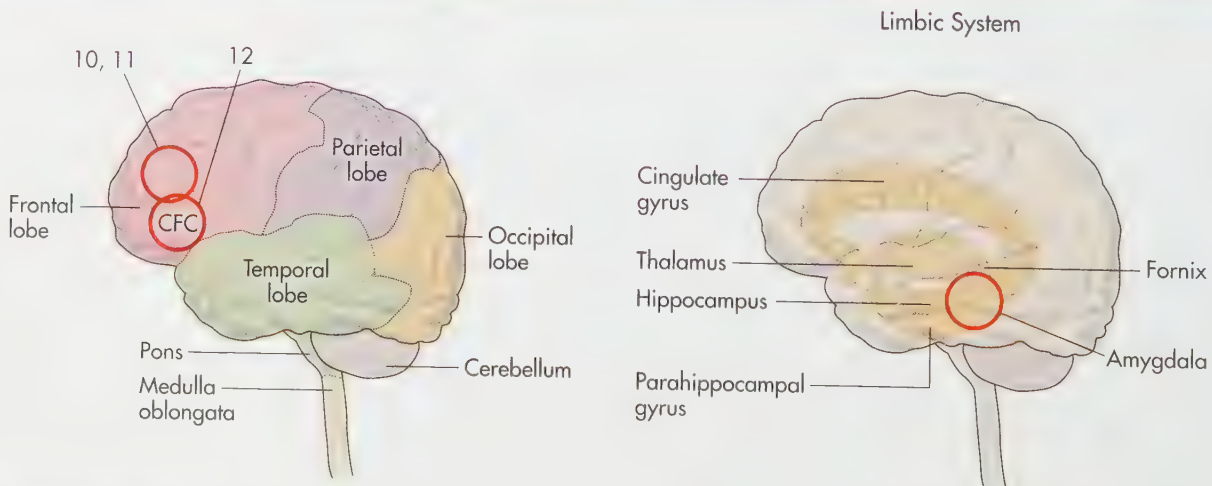
The joint study by economists and biologists that attempts to determine how the brain handles economic decisions.

Attempting to delve into the black box known as the consumer, some economists have joined forces with biologists and neurologists to attempt to see how the brain handles economic decisions. This is the study of **neuroeconomics**. It has long been known that different sectors of the human prefrontal cortex are involved in distinctive cognitive and behavioral operations. Figure 3 illustrates the anatomy of the brain. The frontal lobe carries out most decision making. Strategic thinking takes place in the prefrontal cortex, noted as areas 10 and 11. The orbital frontal cortex (CFC), or sections 11 and 12, account for the joy or pain of monetary rewards and punishments. Rewards and punishments are dealt with in different parts of the brain: The right CFC handles punishment, and the bilateral medial handles reward. In addition, pain registers more than an equal reward registers.

**4.b.1. The Emotional versus the Logical Brain** Magnetic resonance imaging scans have revealed the two parts of the brain in which most decisions take place. The emotional part is the limbic system (especially the amygdala). The logical part is the prefrontal cortex. Neuroeconomists have found that different kinds of decisions show up as increased electrical activity in either the emotional or the logical part. Often a decision is the result of conflicts between the two brain sections. For instance, decisions about the far-off future involve both the prefrontal cortex and the amygdala. The prefrontal cortex takes a long-term perspective, looking at logical cost-benefit comparisons. The amygdala confuses this logic by bringing in emotions, and in some cases it takes over and demands immediate gratification.

Age-based differences in decision making stem from brain development. Adults have greater activity in their frontal lobes and lower activity in their amygdala than do teenagers. The amygdala is more primitive and deals with emotions; the frontal lobes deal

**FIGURE 3** Anatomy of the Brain



Within the brain, logical decisions take place in the prefrontal cortex. Emotional decisions take place in the limbic system or the amygdala.

more with reasoning. Another finding is that the limbic system has a hard time imagining the future, even though our prefrontal cortex clearly sees the future consequences of our current actions. Our emotional brain wants to max out the credit card, order dessert, and smoke a cigarette. Our logical brain knows that we should save for retirement, go for a run, and quit smoking. What we actually do depends on which is dominant at that point in time.

## RECAP

1. Behavioral economics is the study of decision making assuming that people are rational in a broad sense. The human brain economizes, enabling people to make decisions without having complete and perfect information.
2. Neuroeconomics combines neurology and economics. It attempts to measure brain activity and map where such activity takes place in order to better understand how decisions are made.

## SUMMARY

### 1. How do consumers decide what to buy?

- Utility is a measure of the satisfaction received from possessing or consuming a good. §1.a
- *Diminishing marginal utility* refers to the decline in marginal utility received from each additional unit of a good that is consumed during a particular period of time. The more of some good a consumer has, the less desirable is another unit of that good. §1.b
- Even if a good is free, a consumer will eventually reach a point where one more unit of the good would be undesirable or distasteful, and he or she will not consume that additional unit. §1.e
- *Consumerequilibrium* refers to the utility-maximizing situation in which the consumer has allocated his or her budget among goods and services in such a way that the marginal utility per dollar of expenditure on the last unit of any good is the same for all goods. It is represented in symbols as  $MU_x/P_x = MU_y/P_y = MU_z/P_z$ . §2.b

### 2. Why does the demand curve slope down?

- The demand curve slopes down because of diminishing marginal utility and consumer equilibrium. §3.a

- The income and substitution effects of a price change occur because of diminishing marginal utility and the equimarginal principle. When the price of one good falls while all other prices remain the same, that good yields more satisfaction per dollar than before, so consumers buy more of it than before. §3.b
- Market demand is the summation of individual demands. §3.b

### 3. What are behavioral economics and neuroeconomics?

- The two fields of study are attempts to jump inside the human being, to discover why and how decisions are made. Behavioral economists have focused on observing decisions made by people in various situations; neuroeconomists have focused on measuring brain activity using technologies such as magnetic resonance imaging scans. §4.a, b

## KEY TERMS

behavioral economics, 126  
bounded rationality, 126  
consumer equilibrium, 121  
diminishing marginal utility, 115

disutility, 116  
equimarginal principle, 121  
marginal utility, 116  
neuroeconomics, 130

total utility, 116  
utility, 115



## EXERCISES

1. Using the following information, calculate total utility and marginal utility.
  - a. Plot the total utility curve.
  - b. Plot marginal utility directly below total utility.
  - c. At what marginal utility value does total utility reach a maximum?

|                                      |      |
|--------------------------------------|------|
| Number of utils for the first unit   | 300  |
| Number of utils for the second unit  | 250  |
| Number of utils for the third unit   | 220  |
| Number of utils for the fourth unit  | 160  |
| Number of utils for the fifth unit   | 100  |
| Number of utils for the sixth unit   | 50   |
| Number of utils for the seventh unit | 20   |
| Number of utils for the eighth unit  | 0    |
| Number of utils for the ninth unit   | -250 |

2. Is it possible for marginal utility to be negative and total utility positive? Explain.
3. Suppose Mary is in consumer equilibrium. The marginal utility of good A is 30, and the price of good A is \$2.
  - a. If the price of good B is \$4, the price of good C is \$3, the price of good D is \$1, and the price of all other goods and services is \$5, what is the marginal utility of each of the goods Mary is purchasing?
  - b. If Mary has chosen to keep \$10 in savings, what is the ratio of  $MU$  to  $P$  for savings?
4. Using the following utility schedule, derive a demand curve for pizza.
  - a. Assume income is \$10, the price of each slice of pizza is \$1, and the price of each glass of beer is \$2. Then change the price of pizza to \$2 per slice.
  - b. Now change income to \$12 and derive a demand curve for pizza.

| Slices of Pizza | Total Utility | Glasses of Beer | Total Utility |
|-----------------|---------------|-----------------|---------------|
| 1               | 200           | 1               | 500           |
| 2               | 380           | 2               | 800           |
| 3               | 540           | 3               | 900           |
| 4               | 600           | 4               | 920           |
| 5               | 630           | 5               | 930           |

5. Using utility, explain the following commonly made statements:
  - a. I couldn't eat another bite.
  - b. I'll never get tired of your cooking.
  - c. The last drop tastes as good as the first.

- d. I wouldn't eat broccoli if you paid me.
- e. My kid would eat nothing but junk food if I allowed her.
- f. Any job worth doing is worth doing well.
6. How would guests' behavior be likely to differ at a BYOB (bring your own bottle) party from one at which the host provides the drinks? Explain your answer.
7. A round of golf on a municipal golf course usually takes about five hours. At a private country club golf course, a round takes less than four hours. What accounts for the difference? Would the time spent playing golf be different if golfers paid only an admission fee (membership fee) and no monthly dues or if they paid only a charge per round and no monthly dues?
8. To increase marginal utility, you must decrease consumption (everything else held constant). This statement is correct, even though it sounds strange. Explain why.
9. Suppose that the marginal utility of good A is 4 times the marginal utility of good B, but the price of good A is only 2 times the price of good B. Is this point consumer equilibrium? If not, what will occur?
10. Last Saturday, you went to a movie and ate a large box of popcorn and two candy bars and drank a medium soda. This Saturday, you went to a movie and ate a medium box of popcorn and one candy bar and drank a large soda. Your tastes and preferences did not change. What could explain the different combinations of goods that you purchased?
11. Peer pressure is an important influence on the behavior of youngsters. For instance, many preteens begin smoking because their friends pressure them into being "cool" by smoking. Using utility theory, how would you explain peer pressure? How would this compare with the explanations provided by behavioral economics and neuroeconomics?
12. Many people who earn incomes below some level receive food stamps from the government. Economists argue that these people would be better off if the government gave them the cash equivalent of the food stamps rather than the food stamps. What is the basis of the economists' argument?
13. What is the purpose of the two fields of study, neuroeconomics and behavioral economics? Why might people tend to be overconfident?

14. What does it mean to say that people like to “play with the house’s money”?
15. Can you see a connection between the emotional and logical brain and the action known as loss aversion?
16. Would it make any sense to say that, since a change in tax policy makes Jorge lose utility while Mary and Dimitri gain utility, the policy is good if the loss in Jorge’s utility is less than the combined gain in Mary and Dimitri’s utilities? How about the other way around—Jorge’s loss of utility is greater than Mary and Dimitri’s combined gain?
17. As people age, they typically spend more on luxury goods than when they are younger. Does this mean that diminishing marginal utility of money declines as people age?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

# HAPPINESS IS THE MEASURE OF TRUE WEALTH

*The Daily Telegraph (London), April 10, 2008*

**I**t comes as no surprise to learn from a study published this week that, although Britons are twice as rich as they were in 1987, they are no happier. The lack of relationship between wealth and happiness has long been common knowledge, and the knowledge itself has long been a source of happiness to moralisers who like the fact that money is not life's answer.

There are, though, two confusions involved in the idea that anything significant can be discovered by looking for a correlation between wealth and happiness. One concerns the nature of happiness, the other the nature of wealth.

If you could arrange for Britain's population to make a sudden return to 1987 levels of income and possessions, almost everybody would be unhappy. As wealth increases, so do expectations, and so does being accustomed to the lifestyle that the new level of wealth brings. For most people it is likely that wealth has to improve in order for their happiness level to remain constant; if their wealth were to decline, so would their happiness.

The important point here is that "happiness" is too vague and baggy a notion to be truly helpful. It is like an old pair of knickers that has lost its elastic and become over-capacious and shapeless. Instead of talking about happiness,

one should talk about satisfaction, achievement, interest, engagement, enjoyment, growth and the constant opening of fresh possibilities. Very often the activities that yield these things are challenging, even effortful. A person in the midst of doing something objectively worthwhile might not describe himself as happy—usually he will be too absorbed to notice—and only later will realise that what it is to be happy is to be absorbed in something worthwhile.

If mere happiness were the point, we could easily achieve it for everyone by suitably medicating the water supply. But it has often been well said that the surest way to unhappiness is to seek happiness directly. Instead, happiness comes as a sideline of other endeavours that in themselves bring satisfaction and a sense of achievement. It is like the dot of light in a dark room that one cannot see when looking directly at it, but notices out of the corner of one's eye on looking away.

The other confusion concerns wealth. If a person has a million pounds in the bank and never touches a penny of it, or a huge mansion and never occupies it, it is the same as if he had neither the money nor the house. What this shows is that wealth is not so much what one has, but what one does with it. A man who has a thousand pounds and spends it on a wonderful trip to the Galapa-

gos Islands is a rich man indeed: the experiences, the things learnt, the differences wrought in him by both, are true wealth. If you would like to know how rich a person is, you need to ask not how much money he has, but how much he has spent.

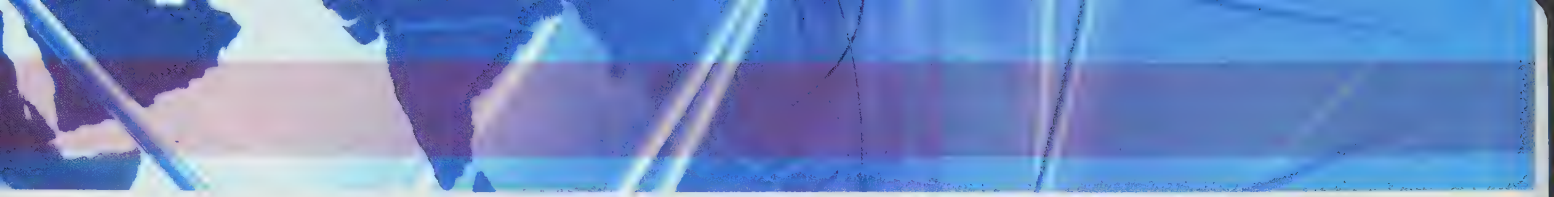
This idea is associated with the wise teaching that the philosophers and poets of antiquity never tired of repeating: that a rich person is he who has enough. If his needs are modest and his habits frugal, then so long as his resources provide enough to meet both, he is rich.

But the man is poor who, despite owning millions, restlessly yearns for more because he feels he cannot have enough, and in particular who lacks the things money cannot buy—ah yes, for these unpurchasable treasures can never be left out of the picture: friendship, love, a sound digestion and a reliable, natural ability to sleep at nights, are indispensable to the possibility of happiness, if not directly supplying it.

In thinking about happiness and wealth, one should avoid using the words "happiness" and "wealth," and think instead of more accurate and more substantial words that denote what one truly thinks these things are.

To mention satisfaction and achievement is to suggest activity of some kind—doing and making, helping, learning, changing—which





might seem obvious to most, but is chosen by surprisingly few.

Ruskin tellingly remarked “a man wrapped up in himself makes a very small parcel,” and this, alas, characterises too many people. The limited surface area of such parcels does not attract

much of the golden dust of satisfaction.

The true equation between happiness and wealth is this: that happiness is wealth. Unlike wealth in the form of money and possessions, such happiness can never be quantified, only felt; and

if one has it, it does not matter if the level of it always stays the same.

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**Source:** The Daily Telegraph (LONDON), April 10, 2008, A. C. Grayling. © Telegraph Media Group Limited 2008.

**W**e all want more—we assume that if we had all the money in the world, we would be happy and fulfilled, don't we? That assumption is wrong; more is not always better than less. More disease, more filth, more garbage, more pollution, more of many things is not better than less. With respect to goods, we do assume that more is better than less as long as there is no problem in storing or keeping the goods and services and as long as our tastes do not change. The cake example used in the text, where our consumer ate so much that he or she nearly got sick, illustrates nicely that more is preferred to less as long as there are no storage costs; it is simply impossible to "store" an infinite amount of cake, that is, to eat it. Eventually, more cake is not desired. This is the law of diminishing marginal utility in operation. It says that during a given period of time, as we get more of an additional good, the marginal amount of that good will provide us less additional happiness than a previous amount did.

In the Economic Insight "Does Money Buy Happiness?" it was shown that up to some income level, money and expressed happiness seem to rise together, but then, as money continues to rise, happiness does not. This article clarifies the issue, indicating that money enables people to purchase time to do those things that make them happier. People want more money—more money enables people to purchase more of everything, and so more money equates to more happiness. This seems to occur, but only up to a point—once someone has a bunch of money, additional amounts do not mean very much.

What does more income do? It enables people to purchase more of everything. The consumer

equilibrium formula states that a consumer will purchase additional amounts of items until the consumer's budget is spent and the marginal utility of each dollar of expenditures is nearly equal across all purchases:

$$MU_x/P_x = MU_y/P_y = MU_z/P_z$$

With more income, more of everything can be purchased. The consumer still purchases by spending the budget on each good and service up to the point where the last dollar spent on each item yields the same additional utility. So the question is, do people also experience diminishing marginal utility with money? The answer has to be no as long as there are no costs of storage and tastes do not change.

The theme of the article is that people tend to dislike work, commuting, child care, and housework but enjoy playing, exercising, making love, reading, and walking, and that income enables people to do more of what they like. The study referred to in the article found that those with incomes below \$30,000 a year spend about 50 percent more time in an unpleasant state than do people with income above \$100,000.

This is not to say that everyone feels the same—many people love their jobs. But, on average, more people like leisure than they do work, house care, and child care. The utility of each individual for the same item (money or any other item) is different; comparing one person's utility (happiness) to another's is not possible. How can you measure whether one person is happier than another? Perhaps some day neuroeconomics will enable such comparisons to be made.

# Indifference Analysis

## 1. Indifference Curves

In Figure 1, four combinations of CDs and gallons of gasoline are listed in the table and plotted in Figure 1(a). Preferring more to less, the consumer will clearly prefer *C* to the other combinations. Combination *C* is preferred to *B* because *C* offers one more gallon of gas than *B* and the same amount of CDs. Combination *C* is preferred to *A* because *C* offers both one more CD and one more gallon of gas than *A*. And Combinations *B* and *D* are preferred to *A*; however, it is not obvious whether *B* is preferred to *D* or *D* is preferred to *B*.

Let's assume that the consumer has no preference between *B* and *D*. We thus say that the consumer is **indifferent** between combination *B* (2 CDs and 1 gallon of gas) and combination *D* (1 CD and 2 gallons of gas). Connecting points *B* and *D*, as in Figure 1(b), produces an indifference curve. An **indifference curve** shows all the combinations of two goods that the consumer is indifferent among, or, in other words, an indifference curve shows all the combinations of goods that will give the consumer the same level of total utility.

**indifferent**

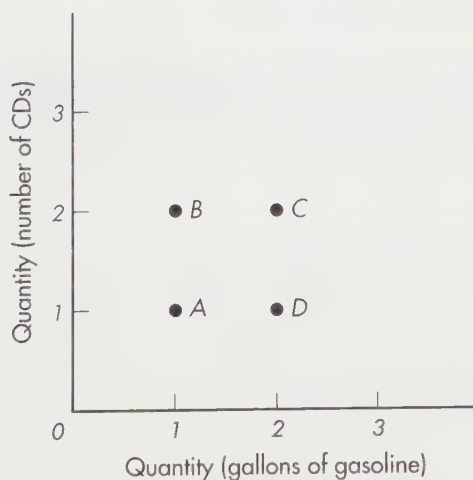
Lacking any preference.

**indifference curve**

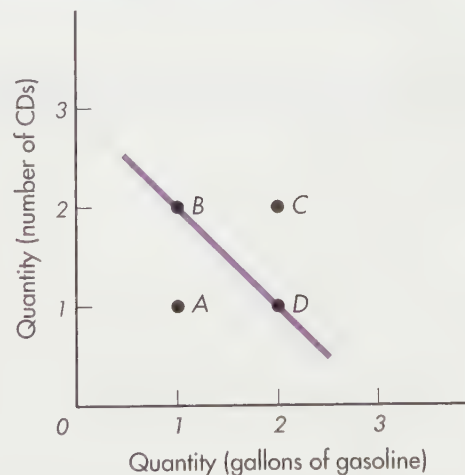
A curve showing all combinations of two goods that the consumer is indifferent among.

**FIGURE 1** Indifference Curve

(a) Combinations of CDs and Gasoline



(b) Indifference Curve



Four combinations of two goods, CDs and gasoline, are presented to the consumer in Figure 1(a). Preferring more to less, the consumer will clearly prefer *C* to *A*, *B*, and *D*. Points *B* and *D* are preferred to *A*, but the consumer has no clear preference between *B* and *D*. The consumer is indifferent between *B* and *D*. Figure 1(b) shows that all combinations of goods among which the consumer is indifferent lie along an indifference curve.



The quantity of goods increases as the distance from the origin increases. Thus, any combination lying on the indifference curve (like  $B$  or  $D$ ) is preferred to any combination falling below the curve, or closer to the origin (like  $A$ ). Any combination appearing above the curve, or farther from the origin (like  $C$ ), is preferred to any combination lying on the curve.

### 1.a. The Shape of Indifference Curves

The most reasonable shape for an indifference curve is a downward slope from left to right, indicating that as less of one good is consumed, more of another good is consumed. Indifference curves are not likely to be vertical, horizontal, or upward sloping. They do not touch the axes, and they do not touch each other.

An indifference curve that is a vertical line, like the one labeled  $I_v$  in Figure 2(a), would mean that the consumer is indifferent to combinations  $B$  and  $A$ . For most goods this will not be the case, because combination  $B$  provides more of one good with no less of the other good.

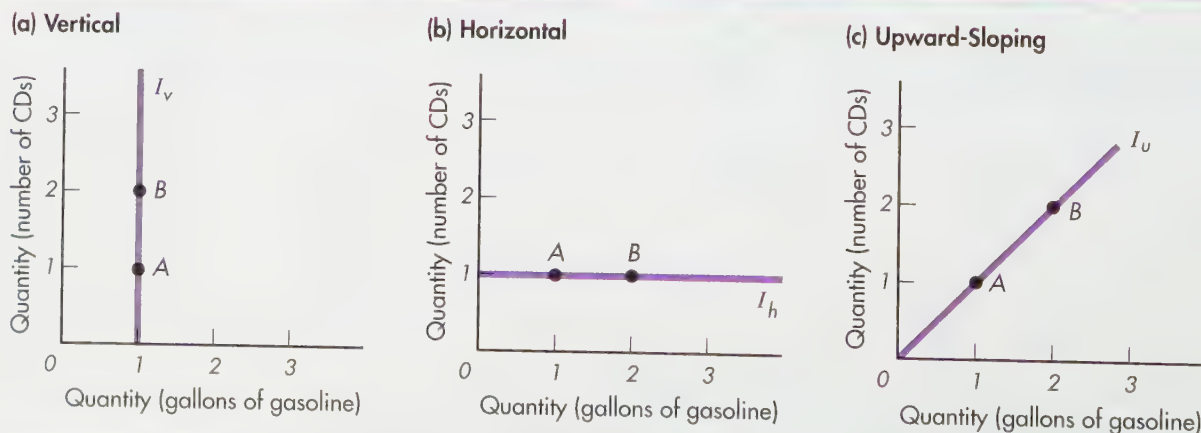
Similarly, horizontal indifference curves, such as line  $I_h$  in Figure 2(b), are ruled out for most goods. People are not likely to be indifferent between combinations  $A$  and  $B$  along the horizontal curve, since  $B$  provides more of one good with no less of the other good than  $A$ .

An upward-sloping curve, such as  $I_u$  in Figure 2(c), would mean that the consumer is indifferent between a combination of goods that provides less of everything and a combination that provides more of everything (compare points  $A$  and  $B$ ). Rational consumers tend to prefer more to less.

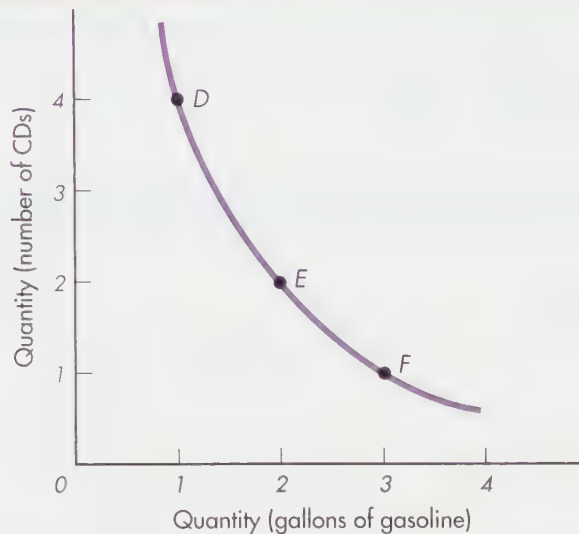
### 1.b. The Slope of Indifference Curves

The slope, or steepness, of indifference curves is determined by consumer preferences. The amount of one good that a consumer must give up to get an additional unit of the other good and remain equally satisfied changes as the consumer trades off one good for the other. The less a consumer has of a good, the more the consumer values an additional unit of that good. This preference is shown by an indifference curve that bows in toward the origin, like the curve shown in Figure 3. A consumer who has 4 CDs and 1 gallon of gasoline (point  $D$ ) may be willing to give up 2 CDs for 1 more gallon of gasoline, moving from  $D$  to  $E$ . But a consumer who has only 2 CDs may be willing to give up only 1 CD to get that additional gallon of gasoline. This preference is shown as the move from  $E$  to  $F$ .

**FIGURE 2** Unlikely Shapes of Indifference Curves



A vertical indifference curve, as in Figure 2(a), would violate the condition that more is preferred to less, as would a horizontal indifference curve, as in Figure 2(b), or an upward-sloping curve, as in Figure 2(c). Thus, indifference curves are not likely to have any of these shapes.

**FIGURE 3** Bowed-In Indifference Curve

Indifference curves slope down from left to right and bow in toward the origin. They bow in because consumers value a good relatively more if they have less of it, other things being equal. At the top of the curve, where a little gasoline and many CDs are represented by point *D*, the consumer is willing to give up 2 CDs to get 1 gallon of gasoline. But lower down on the curve, such as at point *E*, the consumer has more gasoline and fewer CDs than at point *D* and thus is willing to give up fewer CDs to get 1 more gallon of gasoline.

### 1.c. Indifference Curves Cannot Cross

Indifference curves do not intersect. If the curves crossed, two combinations of goods that clearly are not equally preferred by the consumer would seem to be equally preferred. According to Figure 4, the consumer is indifferent between *A* and *B* along indifference curve  $I_2$  and indifferent between *B* and *C* along indifference curve  $I_1$ . Thus, the consumer appears to be indifferent among *A*, *B*, and *C*. Combination *C*, however, offers more CDs and no less gasoline than combination *A*. Clearly, the consumer, preferring more to less, will prefer *C* to *A*. Thus, indifference curves are not allowed to cross.

### 1.d. An Indifference Map

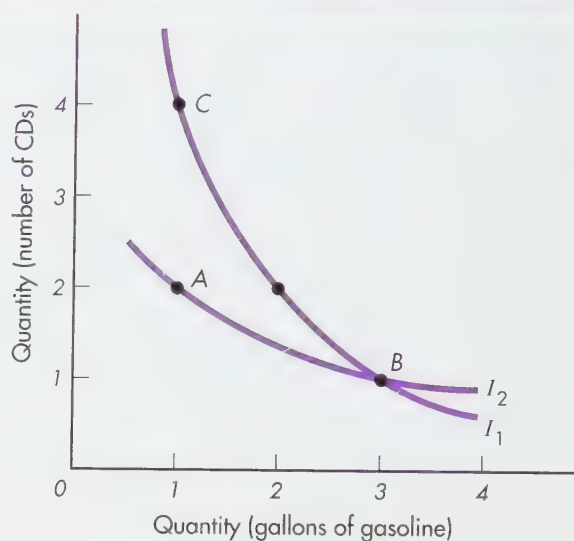
An **indifference map**, located in the positive quadrant of a graph, indicates the consumer's preferences among all combinations of goods and services. The farther from the origin an indifference curve is, the more the combinations of goods along that curve are preferred. The arrow in Figure 5 indicates the ordering of preferences:  $I_2$  is preferred to  $I_1$ ;  $I_3$  is preferred to  $I_2$  and  $I_1$ ;  $I_4$  is preferred to  $I_3$ ,  $I_2$ , and  $I_1$ ; and so on.

**indifference map**

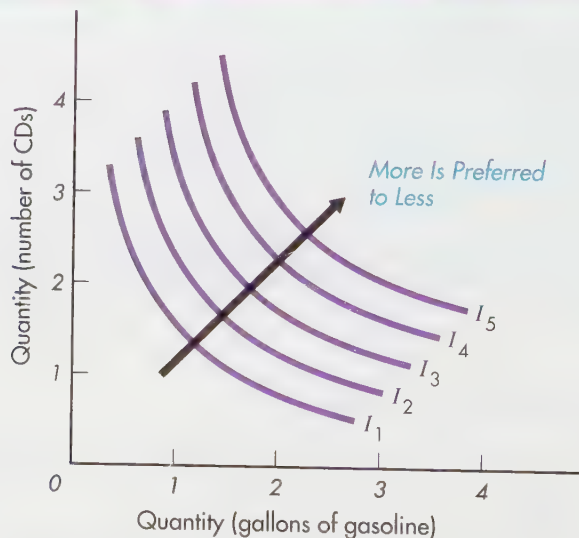
A complete set of indifference curves.

## 2. Consumer Equilibrium

The indifference map reveals only the combinations of goods and services that a consumer prefers or is indifferent among—what the consumer is *willing* to buy. It does not tell us what the consumer is *able* to buy. Consumers' income levels or budgets limit the amount that they can purchase.

**FIGURE 4** Indifference Curves Do Not Cross

If two indifference curves intersected, such as at point *B*, then the consumer would be indifferent among all points on each curve. But point *C* clearly provides more CDs than point *A* and no less gasoline, so the consumer will prefer *C* to *A*. If the consumer prefers more to less, the indifference curves will not cross.

**FIGURE 5** Indifference Map

Indifference curves cover the entire positive quadrant. As we move away from the origin, more is preferred to less:  $I_5$  is preferred to  $I_4$ ,  $I_4$  is preferred to  $I_3$ , and so on.

### **budget line**

A line showing all the combinations of goods that can be purchased with a given level of income.

## **2.a. Budget Constraint**

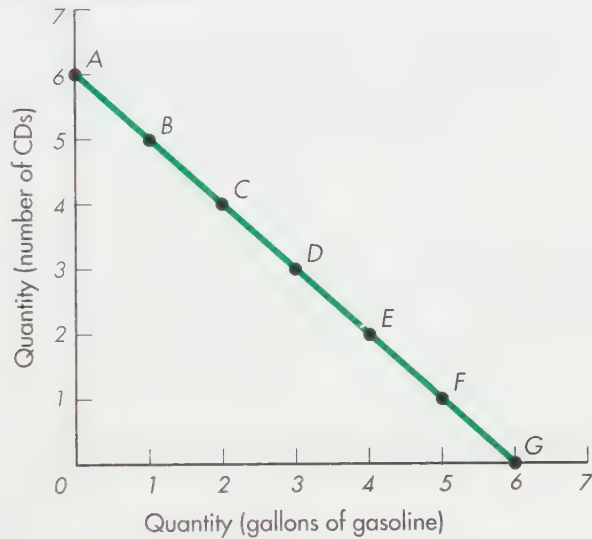
Let's suppose a consumer has allocated \$6 to spend on gas and CDs. Figure 6 shows the **budget line**, a line giving all the combinations of goods that a consumer with a given budget can buy at given prices.



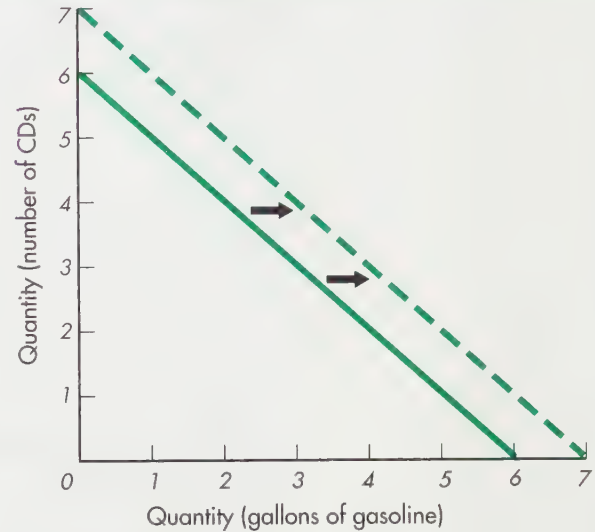
Anywhere along the budget line in Figure 6(a), the consumer is spending \$6. When the price of CDs is \$1 and the price of gas is \$1 per gallon, the consumer can choose among several different combinations of CDs and gas that add up to \$6. If only CDs are purchased, 6 CDs can be purchased (point A). If only gas is purchased, 6 gallons of gas can be purchased (point G). At point B, 5 CDs and 1 gallon of gas can be purchased. At point C, 4 CDs and 2 gallons of gas can be purchased. At point E, 1 CD and 5 gallons of gas can be purchased.

**FIGURE 6** The Budget Line

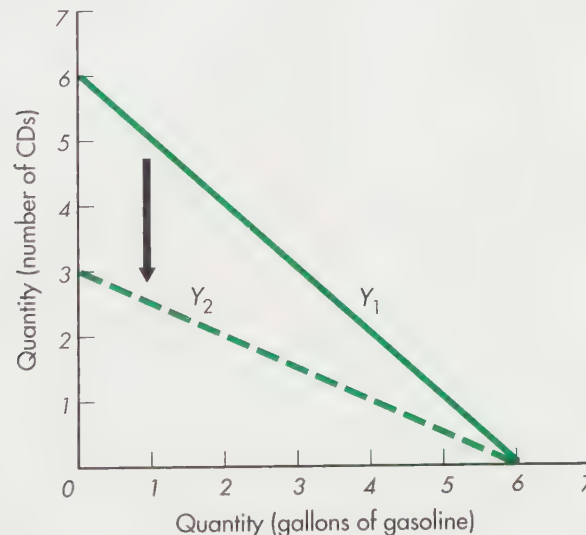
**(a) Initial Budget Line**



**(b) Shift Due to Income Increase**



**(c) Shift (Rotation) Due to Relative Price Change**



In Figure 6(a), a budget line is drawn for a consumer with a \$6 budget to be spent on CDs and gallons of gasoline costing \$1 each. The consumer can purchase 6 CDs and no gas, 5 CDs and 1 gallon of gas, and so on. In Figure 6(b), the budget line shifts outward because the budget is increased from \$6 to \$7 and the consumer can purchase more. In Figure 6(c), the initial budget line ( $Y_1$ ) runs from 6 to 6. When the price of CDs increases from \$1 to \$2, the budget line ( $Y_2$ ) rotates down along the CD axis. Spending the entire \$6 budget on CDs allows the consumer to buy only 3 CDs rather than the 6 that were obtained at the per unit price of \$1.

An increase in the consumer's income or budget is shown as an outward shift of the budget line. Figure 6(b) shows an increase in income from \$6 to \$7. The budget line shifts out to the line running from 7 to 7. A change in income or in the consumer's budget causes a parallel shift of the budget line.

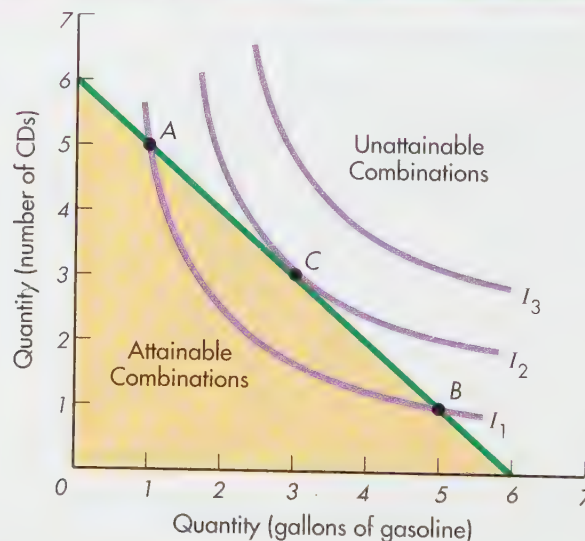
A change in the price of one of the goods causes the budget line to rotate. For example, with a budget of \$6 and the prices of both CDs and gas at \$1, we have the budget line  $Y_1$  in Figure 6(c). If the price of CDs rises to \$2, only 3 CDs can be purchased if the entire budget is spent on CDs. As a result, the budget line  $Y_2$  is flatter, running from 3 on the vertical axis to 6 on the horizontal axis. Conversely, a rise in the price of gas would cause the budget line to become steeper.

## 2.b. Consumer Equilibrium

Putting the budget line on the indifference map allows us to determine the one combination of goods and services that the consumer is both *willing* and *able* to purchase. Any combination of goods that lies on or below the budget line is within the consumer's budget. Which combination will the consumer choose in order to yield the greatest satisfaction (utility)?

The budget line in Figure 7 indicates that most of the combinations on indifference curve  $I_1$  and point C on indifference curve  $I_2$  are attainable. Combinations on indifference curve  $I_3$  are preferred to combinations on  $I_2$ , but the consumer is *not able* to buy combinations on  $I_3$  because they cost more than the consumer's budget. Therefore,

**FIGURE 7** Consumer Equilibrium



The consumer maximizes satisfaction by purchasing the combination of goods that is on the indifference curve farthest from the origin but attainable given the consumer's budget. The combinations along  $I_1$  are attainable, but so are some of the combinations that lie above  $I_1$ . Combinations beyond the budget line, such as those along  $I_3$ , cost more than the consumer's budget. Point C, where the indifference curve  $I_2$  just touches, or is tangent to, the budget line, is the chosen combination and the point of consumer equilibrium.

**Source:** Adapted from David G. Myers, *The Pursuit of Happiness* (New York: William Morrow, 1992).

point *C* represents the maximum level of satisfaction, or utility, available to the consumer. Point *C* is the point where the budget line is tangent to (just touches) the indifference curve.

## SUMMARY

- Indifference curves show all combinations of two goods that give the consumer the same level of total utility. §1
- An indifference map is a complete set of indifference curves in the positive quadrant of a graph. §1.d
- The indifference curve indicates what the consumer is willing to buy. The budget line indicates what the consumer is able to buy. Together they determine the combinations of goods that the consumer is both willing and able to buy. §2.a
- Consumer equilibrium occurs at the point where the budget line just touches, or is tangent to, an indifference curve. §2.b

## KEY TERMS

budget line, 140  
indifference curve, 137

indifference map, 139

indifferent, 137

## EXERCISES

1. Use these combinations for parts a and b:

| Combination | Clothes   | Food     |
|-------------|-----------|----------|
| A           | 1 basket  | 1 pound  |
| B           | 1 basket  | 2 pounds |
| C           | 1 basket  | 3 pounds |
| D           | 2 baskets | 1 pound  |
| E           | 2 baskets | 2 pounds |
| F           | 2 baskets | 3 pounds |
| G           | 3 baskets | 1 pound  |
| H           | 3 baskets | 2 pounds |
| I           | 3 baskets | 3 pounds |

- a. If more is preferred to less, which combinations are clearly preferred to other combinations? Rank the combinations in the order of preference.

- b. Some clothes–food combinations cannot be clearly ranked. Why not?
2. Explain why two indifference curves cannot cross.
3. Using the data that follow, plot two demand curves for cake. Then explain what could have led to the shift of the demand curve.

| I. Price of<br>Cake | Quantity of<br>Cake<br>Demanded | II. Price of<br>Cake | Quantity of<br>Cake<br>Demanded |
|---------------------|---------------------------------|----------------------|---------------------------------|
| \$1                 | 10                              | \$1                  | 14                              |
| \$2                 | 8                               | \$2                  | 10                              |
| \$3                 | 4                               | \$3                  | 8                               |
| \$4                 | 3                               | \$4                  | 6                               |
| \$5                 | 1                               | \$5                  | 5                               |



# Supply: The Costs of Doing Business

MAKE IT. BUY IT. MAKE IT.



## FUNDAMENTAL QUESTIONS

- 1 What is the law of diminishing marginal returns?
- 2 What is the relationship between costs and output in the short run?
- 3 What is the relationship between costs and output in the long run?



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In the previous chapter, we looked closely at demand. We learned that the demand for any one item comes from individuals choosing to allocate their limited income so as to maximize their utility—their happiness or satisfaction. We noted that demand changes when prices of related goods, income, expectations, and tastes and preferences change. In this chapter, we examine supply. We find that supply comes from the profit objectives of firms, and we learn what causes supply to change.

# 1. Firms and Production

A firm hires labor, purchases materials, rents buildings and land, and spends money on advertising and other selling activities. The quantity of resources used and the amount spent on selling activities depends on how productive these activities are—how much they contribute to the value of the firm. In general, the more the firm wants to supply, the more resources it must have.

## 1.a. The Relationship between Output and Resources

Supply is the quantities of output that sellers are willing and able to offer for sale at every price, everything else held constant. To determine how much to supply at any given price, sellers must know how much it costs to supply each quantity. The relationship between output and costs depends on the relationship between output and the resources used to create that output. Such a relationship is illustrated in Table 1. A firm has a fixed space—say a 500-square-foot retail space in a mall. The quantity of items offered for sale—supplied—depends on the number of employees. One employee can display 30 items, two employees 65 items, three employees 100 items, and so on in that 500-square-foot space in one day's time. If we look at this in terms of how much each new employee adds, we see that the first employee adds 30, the second adds 35, the third adds another 35, the fourth 30, and so on. In other words, as the shop adds an additional employee, the number of items available for sale rises at an increasing rate, then at a decreasing rate, and finally, adding more employees actually causes output to decline.



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Business owners combine quantities of land, labor, and capital to produce goods and services in the most profitable way. Technological improvements help them produce a larger quantity of goods and services at lower cost, thereby increasing profitability. Here, a garment factory in India combines labor with the sewing machines, tables, light, and textiles to produce garments. The sewing machines enable the workers to create many more garments than if they were sewing by hand. With a fixed number of machines and room, employing more people may speed up production; eventually, however, employing more people will not speed up production and could actually retard production as the workers interfere with each other's tasks.



**TABLE 1** Diminishing Marginal Returns

As another employee is added to the 500 square feet of space, the number of items that can be displayed and offered for sale rises—initially at an accelerating rate, then at a decreasing rate—and eventually declines. The seventh employee adds no additional output, and the eighth causes output to decline.

| Number of Employees | Total Output |
|---------------------|--------------|
| 0                   | 0            |
| 1                   | 30           |
| 2                   | 65           |
| 3                   | 100          |
| 4                   | 130          |
| 5                   | 150          |
| 6                   | 160          |
| 7                   | 160          |
| 8                   | 140          |

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- 1 What is the law of diminishing marginal returns?

### law of diminishing marginal returns

When successive equal amounts of a variable resource are combined with a fixed amount of another resource, marginal increases in output that can be attributed to each additional unit of the variable resource will eventually decline.

## 1.b. Diminishing Marginal Returns

This relationship between employees and output is called the **law of diminishing marginal returns**. Too many employees on the floor at one time trying to display and sell items makes them inefficient—they get in one another's way.

Diminishing marginal returns are not unique to this small retail shop. In every instance where *increasing* amounts of one resource are combined with *fixed* amounts of other resources, the additional output that can be produced initially increases rapidly, then increases more slowly, and eventually decreases.

Diminishing marginal returns applies anywhere that resources whose quantities can be changed are combined with resources whose quantities are fixed. For instance, consider the effort to improve passenger safety during collisions by installing air bags in cars. The first air bag added to a car increases protection considerably (assuming it is put in the steering wheel). The second adds an element of safety, particularly for the front-seat passenger. But additional air bags provide less and less additional protection and eventually would lessen protection as they interfered with one another. As successive units of the variable resource, air bags, are placed on the fixed resource, the car, the additional amount of protection provided by each air bag declines.

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## RECAP

1. According to the law of diminishing marginal returns, as successive units of a variable resource are added to the fixed resources, the additional output produced will initially rise but will eventually decline.
2. Diminishing marginal returns occur because the efficiency of variable resources depends on the quantity of the fixed resources.



## 2. From Production to Costs

Every firm (and every individual and nation as well) is faced with the law of diminishing marginal returns. The law is, in fact, a physical property, not an economic one, but it is important to economics because it defines the relationship between costs and output in the short run.

### 2.a. The Calculation of Costs

Suppose, in our example of Table 1, that the cost per employee is \$1,000 per month and the rent for the 500 square feet is \$6,000 per month. Table 2 shows the costs for the different number of employees used.

We are most interested in the relationship between output and costs because we want to know the costs of supplying output. So we need to convert Table 2 into one that shows the relationship between output and costs. Table 3 shows what happens to costs as output increases in 30-unit increments.

The last column in Table 3, **average total cost (ATC)**, is plotted in Figure 1 with output measured on the horizontal axis and average total cost on the vertical axis. Figure 1 clearly shows that the ATC curve is U-shaped. The “U” occurs because of the law of diminishing marginal returns. As the business increases its output, costs rise, but they rise slowly at first and then rapidly. This means that cost per unit declines initially and then rises, creating a U shape.

**2.a.1. Marginal Cost** Average total cost is calculated by dividing total cost by output—ATC is cost per unit of output, shown in column 5 of Table 3. What does it cost to supply another unit? **Marginal cost (MC)** is the additional cost of supplying another unit of output and is calculated by dividing the change in total cost by the change in output. A change in output, say moving from 0 to 30, causes costs to rise, from \$6,000 to \$7,000; the change in total cost of \$1,000 divided by the change in output of 30 gives the marginal cost of \$33. Table 4 presents marginal cost.

In column 5 of Table 4, the relationship between average total cost and marginal cost is noted. When marginal cost is greater than average total cost, average total cost

#### average total cost (ATC)

The per unit cost, derived by dividing total cost by the quantity of output.

#### marginal cost (MC)

The change in cost caused by a change in output, derived by dividing the change in total cost by the change in the quantity of output.

**TABLE 1** Costs

As employees are added, costs rise at a rate of \$1,000 per employee. The cost of the building space is fixed at \$6,000. Adding the cost of employees, variable cost, to the fixed cost gives the total cost, noted in column 5. Column 3 shows total variable costs, the costs of the resources that vary as output changes—employees in our example. Column 4 shows the fixed costs, the costs that do not change as output changes—selling space in the mall in our example. The last column shows total costs, the sum of variable and fixed costs.

| 1<br>Employees | 2<br>Total<br>Output | 3<br>Variable Costs<br>(Costs of<br>Employees) | 4<br>Fixed Cost<br>(Cost of 500<br>Square Feet) | 5<br>Total Cost<br>(Fixed + Variable) |
|----------------|----------------------|--|---|---------------------------------------|
| 0              | 0                    | 0  | \$6,000   | \$ 6,000                              |
| 1              | 30                   | \$1,000  | \$6,000   | \$ 7,000                              |
| 2              | 65                   | \$2,000  | \$6,000   | \$ 8,000                              |
| 3              | 100                  | \$3,000  | \$6,000   | \$ 9,000                              |
| 4              | 130                  | \$4,000  | \$6,000   | \$10,000                              |
| 5              | 150                  | \$5,000  | \$6,000   | \$11,000                              |
| 6              | 160                  | \$6,000  | \$6,000   | \$12,000                              |
| 7              | 160                  | \$7,000  | \$6,000   | \$13,000                              |

**TABLE 3** Output and Costs

Column 1 shows output in 30-unit increments. Column 2 shows the cost of employees—variable costs—that are required to increase output by 30 units. Column 3 is the fixed cost—the rent of the 500 square feet. Column 4 is total cost. Column 5 is average total cost (column 4 divided by column 1).

| 1<br>Total Output | 2<br>Variable Costs | 3<br>Fixed Costs | 4<br>Total Cost | 5<br>Average Total Cost |
|-------------------|---------------------|------------------|-----------------|-------------------------|
| 0                 | 0                   | \$6,000          | \$ 6,000        | —                       |
| 30                | \$1,000             | \$6,000          | \$ 7,000        | \$ 7,000/3 = \$233      |
| 60                | \$1,920             | \$6,000          | \$ 7,920        | \$ 7,920/60 = \$132     |
| 90                | \$2,820             | \$6,000          | \$ 8,820        | \$ 8,820/90 = \$98      |
| 120               | \$3,745             | \$6,000          | \$ 9,745        | \$ 9,745/120 = \$81     |
| 150               | \$5,000             | \$6,000          | \$11,000        | \$11,000/150 = \$73.33  |
| 160*              | \$6,000             | \$6,000          | \$12,000        | \$12,000/160 = \$75     |
| 160*              | \$7,000             | \$6,000          | \$13,000        | \$13,000/160 = \$81     |

\*Given 500 square feet, the most that can be produced is 160, according to Table 1.

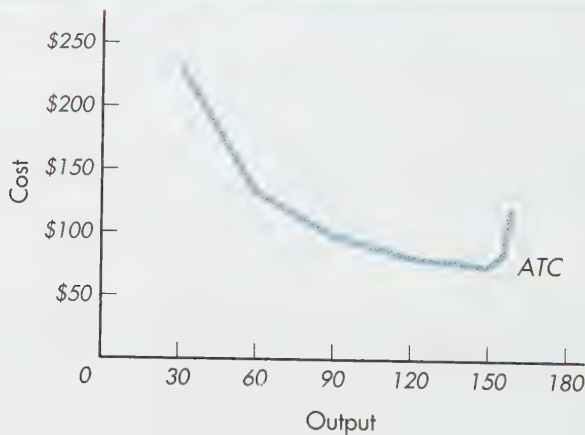
**FIGURE 1** Average Total Cost

Table 3 plotted. The last column of Table 3 is the average total cost, ATC. Plotting the cost on the vertical axis and the quantity of output on the horizontal axis generates the ATC curve.

rises—the ATC curve slopes up. When marginal cost is below average total cost, then average total cost falls—the ATC curve slopes down. Marginal cost equals average total cost when average total cost is at its minimum.

This relationship between marginal and average exists for any average and marginal measurement. Consider your grades, for example. Think of the grade point average (GPA) that you get each semester as your *marginal* GPA, and your cumulative, or overall, GPA as your *average* GPA. You can see the relationship between marginal and average by considering what will happen to your cumulative GPA if this semester's GPA is less than your cumulative GPA. Suppose your GPA this semester is 3.0 for 16 hours of classes and your cumulative GPA, not including this semester, is 3.5 for 48 hours of classes. Your marginal (this semester's) GPA will be less than your average GPA. Thus,

**TABLE 4** Marginal Cost

Column 4 is marginal cost, the change in total cost divided by the change in quantity. The change in total cost is the difference between row 1, column 2 and row 2, column 2; then between row 2, column 2 and row 3, column 2, and so on. The change in output is the difference between row 1, column 1 and row 2, column 1; and so on. The last column in the table shows the relationship between *MC* and *ATC*. If *MC* is above *ATC*, *ATC* is rising; if *MC* is below *ATC*, *ATC* is declining; *MC* = *ATC* at the minimum point of *ATC*.

| 1<br>Total Output,<br>Q | 2<br>Total Costs,<br>TC | 3<br>Average<br>Total Cost, TC/Q | 4<br>Marginal Cost,<br>Change in<br>TC/Change in Q | 5<br>Relationship between<br>Average Total Cost and<br>Marginal Cost |
|-------------------------|-------------------------|----------------------------------|--|--|
| 0                       | \$ 6,000                | —                                | —  |  |
| 30                      | \$ 7,000                | \$ 7,000/30 = \$233              | \$1,000/30 = \$33                                  | <i>MC</i> < <i>ATC</i> : <i>ATC</i> falling                          |
| 60                      | \$ 7,920                | \$ 7,920/60 = \$132              | \$ 920/30 = \$31                                   | <i>MC</i> < <i>ATC</i> : <i>ATC</i> falling                          |
| 90                      | \$ 8,820                | \$ 8,820/90 = \$98               | \$ 900/30 = \$30                                   | <i>MC</i> < <i>ATC</i> : <i>ATC</i> falling                          |
| 120                     | \$ 9,745                | \$ 9,745/120 = \$81              | \$ 925/30 = \$31                                   | <i>MC</i> < <i>ATC</i> : <i>ATC</i> falling                          |
| 150                     | \$11,000                | \$11,000/150 = \$73.33           | \$1,255/30 = \$41.83                               | <i>MC</i> < <i>ATC</i> : <i>ATC</i> falling                          |
| 160*                    | \$12,000                | \$12,000/160 = \$75              | \$1,000/10 = \$100*                                | <i>MC</i> > <i>ATC</i> : <i>ATC</i> rising                           |

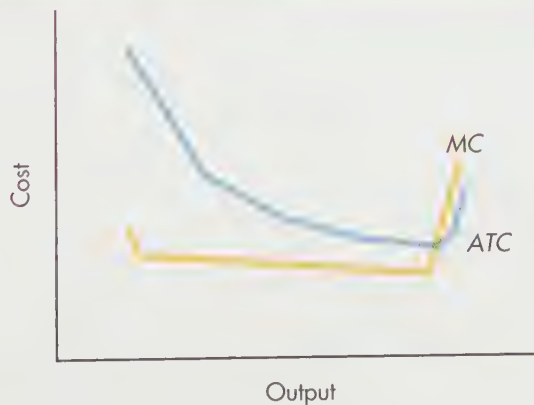
\*Notice that we increase output by only 10 units by adding the sixth worker.

when your marginal GPA is added to your average GPA, your average GPA falls, from 3.5 to 3.375. *As long as the marginal is less than the average, the average falls.* If your GPA this semester is 4.0 instead of 3.0, your average GPA will rise from 3.5 to 3.625. *As long as the marginal is greater than the average, the average rises.*

If the average is falling when marginal is below average and rising when marginal is above average, then marginal and average can be the same only when the average is neither rising nor falling. If your GPA this semester is 3.5 and your cumulative GPA up to this semester was 3.5, then your new GPA will be 3.5. Average and marginal are the same when the average is constant. This occurs only when the average curve is at its maximum or minimum point.

We know that if marginal is less than average, average is falling, and if marginal is above average, average is rising. This is illustrated in Figure 2. Note that the *MC* curve lies below

*Whenever marginal is less than average, the average is falling, and whenever marginal is greater than average, the average is rising.*

**FIGURE 2** Average Total Cost and Marginal Cost

The third and fourth columns of Table 4 are plotted. The relationship between the *ATC* and the *MC* is shown in column 5. If *MC* is less than *ATC*, *ATC* is falling; if *MC* is above *ATC*, then *ATC* is rising. *MC* = *ATC* at the minimum point of *ATC*.



**total costs (TC)**

The expenses that a business has in supplying goods and/or services.

**total fixed costs (TFC)**

Payments to resources whose quantities cannot be changed during a fixed period of time—the short run.



- 2** What is the relationship between costs and output in the short run?

**total variable costs (TVC)**

Payments for additional resources used as output increases.

**average fixed cost (AFC)**

The total fixed cost divided by total output.

**average variable cost (AVC)**

Total variable cost divided by total output.

the average-total-cost curve while  $ATC$  is declining, and that the marginal-cost curve lies above the average-total-cost curve while  $ATC$  is rising. Finally, notice how the marginal-cost curve intersects the average-total-cost curve at the minimum point of the average-total-cost curve. This always occurs: The marginal-cost curve intersects the average-total-cost curve at its minimum point. So when  $MC$  equals  $ATC$ , it is the firm's most efficient point—the firm could not supply at a lower cost per unit of output.

## 2.b. Definition of Costs

We have mentioned several terms associated with costs—total costs, variable costs, fixed costs, marginal costs, and average total costs. Let us discuss these terms to be sure we understand what they measure. **Total costs (TC)** are the expenses that a business has in supplying goods and/or services. They are the payments to land, labor, and capital. These costs can be divided into variable and fixed costs. **Total fixed costs (TFC)** are payments to resources whose quantities cannot be changed during a fixed period of time—the short run. Typically, fixed costs include rent and some of the payments to workers, suppliers, and others; often there are fixed contracts, such as labor contracts and rental agreements, that cannot be changed for a period of time such as a year. Other costs are variable. **Total variable costs (TVC)** are payments for additional resources used as output increases. For instance, we need more electricity and water when we sell more goods and services. We may need to employ workers for more hours or hire temporary workers. These are variable costs. Average costs are simply the costs per unit of output. **Average fixed cost (AFC)** is the total fixed cost divided by total output. **Average variable cost (AVC)** is total variable cost divided by total

## ECONOMIC INSIGHT

### Overhead

Economists classify costs as either fixed or variable. Fixed costs do not change as the volume of production changes. Variable costs, on the other hand, depend on the volume of production. In business, costs are often classified into overhead and direct operating costs. Overhead costs are those that are not directly attributable to the production process. They include items such as taxes, insurance premiums, managerial or administrative salaries, paperwork, the cost of electricity not used in the production process (such as electricity used in the administration building), and so on. Overhead costs can be either fixed or variable. Insurance premiums, taxes, and managerial salaries are fixed costs. They must be paid regardless of how much is produced. Electricity used to operate the production process is a variable cost, increasing as the quantity of output produced is increased. The electricity used in a classroom would be a direct cost whereas the electricity used in the administration building would be an indirect cost.

Statements like “we need to spread the overhead” sound somewhat like the concept of declining average

fixed costs—fixed cost per unit of output declines as output rises. But overhead may also include variable costs. Thus, the need to “spread the overhead” refers to reducing the total costs that are not directly attributable to the production process. The more a firm can keep its overhead costs the same and increase its volume of production, the more overhead costs look and act like fixed costs. The higher the percentage of overhead costs that are fixed, the more closely related the economist's and the businessperson's classifications will be. But the two are not—and are not meant to be—the same.

The different classifications provide different information. The economist is interested in the decision to produce—whether to produce at all, and how much to produce. This is the information provided by fixed and variable costs. The businessperson is interested in attributing costs to different activities, that is, in determining whether the business is running as cost-efficiently as it can. The classification of costs into overhead and direct provides this information.

output. **Short-run average total cost (SRATC)** is the total cost divided by the total output when the firm is operating in the short run—that is, when at least one resource is fixed. Marginal costs are the changes in costs that occur as output is changed.

**short-run average total cost (SRATC)**

The total cost of production divided by the total quantity of output produced when at least one resource is fixed.

## RECAP

1. Costs are the full opportunity costs of resources used to create and sell goods and services.
2. Economists like to discuss costs in terms of fixed and variable costs. Fixed costs are those costs that a firm has in creating and or offering for sale goods and services that do not change as quantities of a good or service offered for sale change. Variable costs are costs that do increase as quantities offered for sale increase.
3. Average costs are total costs divided by the quantity of a good or service being offered for sale—the per unit costs.
4. Marginal costs are the incremental costs, the change in costs that results from a change in the quantity of a good or service offered for sale.

## 3. The Long Run

The short run refers to any period of time (a day, a month, a year, or whatever) during which at least one resource cannot be changed—its quality or quantity is fixed. In the long run, everything is variable—nothing is fixed. A firm can choose to relocate, build a new plant, rent more floor space, acquire heavy equipment, go out of business, enter a new business, or undertake any other action in the long run.

Perhaps the most important difference between the short run and the long run is that the law of diminishing marginal returns does *not* apply when all resources are variable. Diminishing returns applies only when quantities of variable resources are combined with a fixed resource. In the long run, everything is variable.

If you look at Table 1 and ask, “What could happen if we had more employees and a bigger space in the mall or if we went to a different mall?” you then are thinking about the long run. Table 5 shows the long-run version of Table 1. Recall that in Table 1, the floor space was fixed—our fixed resource. Now, in the long run, nothing is fixed; the owner of the firm is able to choose how many employees to hire, how big a building to rent, and how many other resources to acquire; all combinations are possible in the long run. Table 5 illustrates the difference between the short run and the long run. The short run would be the output combinations available in any one column of the table, such as the first two columns—number of employees and 500 square feet of retail space. In the long run, any size of space can be used by any number of employees to supply output.

The way you read Table 5 is to look at the number of employees and the amount of floor space to find how much output can be supplied. For instance, with 1 employee and 500 square feet of space, 30 units of output can be supplied. Doubling the size of the firm—2 employees and 1,000 square feet—means that 250 units of output can be supplied; doubling both resources again, to 4 employees and 2,000 square feet, means that 640 units of output can be supplied. So, doubling the size of the firm initially allows the firm to supply more than double the output.

If the firm can double its resources (and thus double its costs) but more than double its output, it is experiencing what is called *economies of scale*—getting more efficient as it gets bigger. Conversely, if the firm doubles its resources but does not double its output, then it is experiencing *diseconomies of scale*—it is getting less efficient as it gets bigger.



**TABLE 5** Long Run or Planning Period

| Employees | Floor Space (sq ft.) |       |       |       |
|-----------|----------------------|-------|-------|-------|
|           | 500                  | 1,000 | 1,500 | 2,000 |
| 0         | 0                    | 0     | 0     | 0     |
| 1         | 30                   | 100   | 250   | 340   |
| 2         | 65                   | 250   | 360   | 450   |
| 3         | 100                  | 360   | 480   | 570   |
| 4         | 130                  | 440   | 580   | 640   |
| 5         | 150                  | 500   | 650   | 710   |
| 6         | 160                  | 540   | 700   | 760   |
| 7         | 160                  | 550   | 720   | 790   |
| 8         | 140                  | 540   | 680   | 800   |

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- 3** What is the relationship between costs and output in the long run?

### scale

Size; all resources change when scale changes.

## 3.a. Economies of Scale and Long-Run Cost Curves

If the size of the firm doubles when the quantities of all resources are doubled, this is called doubling the scale of the firm. **Scale** means size. In the long run, a firm has many sizes to choose from—those given in Table 5, for instance. The short run requires that scale be fixed—only one or a few resources can be changed. If we are looking at Table 5 and we decide that column 4 is what we think will be the best, then we sign a lease for 1,500 square feet. At this point, we are in the short run. We can vary the number of employees, but we are stuck with the 1,500 square feet of space until the rental agreement can be revised.

The relationship between the long run and the short run is illustrated in Figure 3. For each size or scale, the firm can vary the quantities of the variable resources and supply different quantities of output. Notice in Figure 3(a) that there are several short-run cost curves. Each curve has a minimum point at a different quantity of output. This quantity of output is the scale or size of the firm in the short run. Whether the firm supplies less or more, its costs are defined by the short-run cost curve. The firm cannot change floor space except in the long run—that is, the firm cannot move from  $SRATC_1$  to  $SRATC_2$  except in the long run. In the long run, the firm can select any of the short-run curves to operate on. But once it has selected the size, it is in the short run and operates along just one of the short-run average total-cost curves.

Each short-run cost curve is drawn for a particular quantity of building space—that is, a specific column in Table 5. Once the space is selected, the firm brings together combinations of the other resources to supply output. If a small quantity of the building space is selected, the firm might operate along  $SRATC_1$ . If the firm selects a slightly larger quantity of the fixed resource, then it will be able to operate along  $SRATC_2$ . With a still larger quantity, the firm can operate along  $SRATC_3$ ,  $SRATC_4$ ,  $SRATC_5$ , or some other short-run average-total-cost curve.

In the long run, the firm can choose any of the  $SRATC$  curves. All it needs to do is choose the level of output it wants to supply and then select the least-cost combination of resources with which to reach that level. All possible least-cost combinations are represented in Figure 3(b) by a curve that just touches each  $SRATC$  curve. This curve is the **long-run average-total-cost curve (LRATC)**—the lowest cost per unit of output for every level of output when all resources are variable.

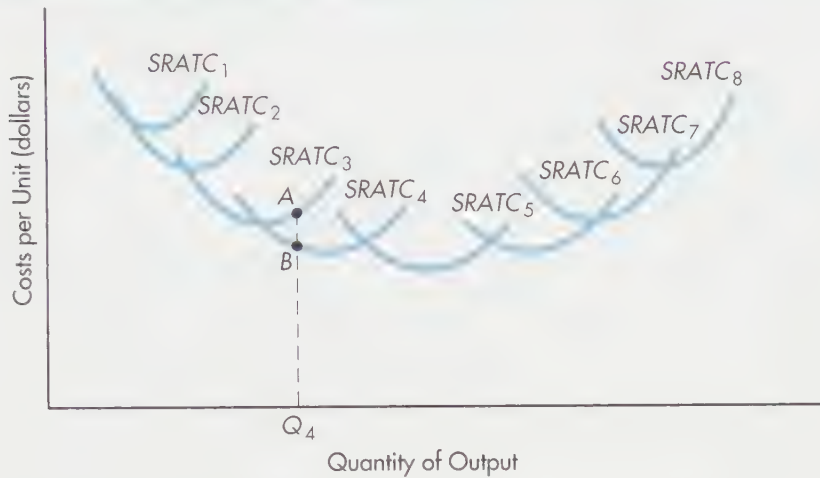
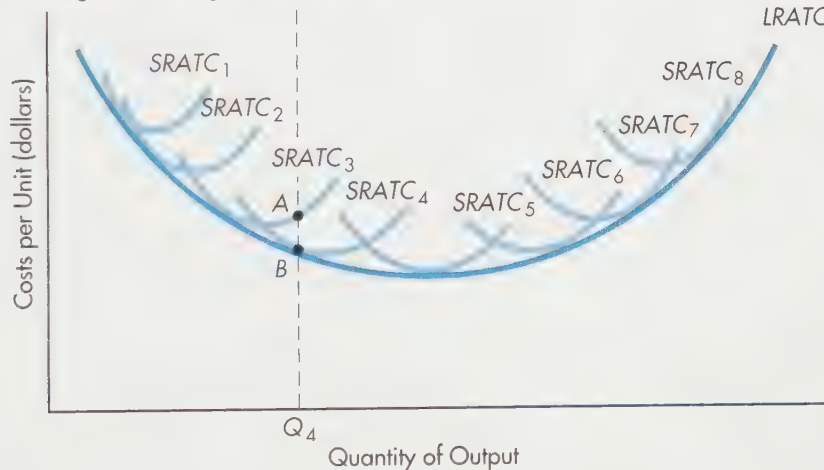
The distinction between the short run and the long run is that everything is variable in the long run. In the short run, something is fixed. The long-run average-total-cost

### long-run average-total-cost curve (LRATC)

The lowest-cost combination of resources with which each level of output is produced when all resources are variable.

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**FIGURE 3** The Short-Run and Long-Run Average-Total-Cost Curves**(a) Short-Run Average-Total-Cost Curves****(b) Long-Run Average-Total-Cost Curve**

The long-run average-total-cost curve represents the lowest costs of producing any level of output when all resources are variable. Short-run average-total-cost curves represent the lowest costs of producing any level of output in the short run, when at least one of the resources is fixed. Figure 3(a) shows the possible *SRATC* curves facing a firm. Figure 3(b) shows the *LRATC* curve, which connects the minimum cost of producing each level of output. Notice that the *SRATC* curves need not indicate the lowest costs of producing in the long run. If the short run is characterized by *SRATC*<sub>3</sub>, then quantity  $Q_4$  can be produced at point A. But if some of the fixed resources are allowed to change, managers can shift to *SRATC*<sub>4</sub> and produce at point B.

**economies of scale**

The decrease in per unit costs as the quantity of production increases and all resources are variable.

**diseconomies of scale**

The increase in per unit costs as the quantity of production increases and all resources are variable.

**constant returns to scale**

Unit costs remain constant as the quantity of production is increased and all resources are variable.

curve gets its shape from **economies of scale** and **diseconomies of scale**. Economies of scale account for the downward-sloping portion of the long-run average-total-cost curve. The firm is able to become more efficient as it gets larger—the cost of supplying each unit of output decreases as the firm gets bigger. Diseconomies of scale account for the upward-sloping portion; the firm becomes less efficient as it gets larger. If the cost per unit of output is constant as output rises, there are **constant returns to scale**.

Figures 4(a), 4(b), and 4(c) show three possible shapes of a long-run average total-cost curve. Figure 4(a) is the usual U shape, indicating that economies of scale are followed by constant returns to scale and then diseconomies of scale. Figure 4(b) is a curve indicating only economies of scale. Figure 4(c) is a curve indicating only constant returns to scale. Each of these long-run average-total-cost curves would connect several short-run average-total-cost curves, as shown in Figures 4(d), 4(e), and 4(f).

### 3.b. The Reasons for Economies and Diseconomies of Scale

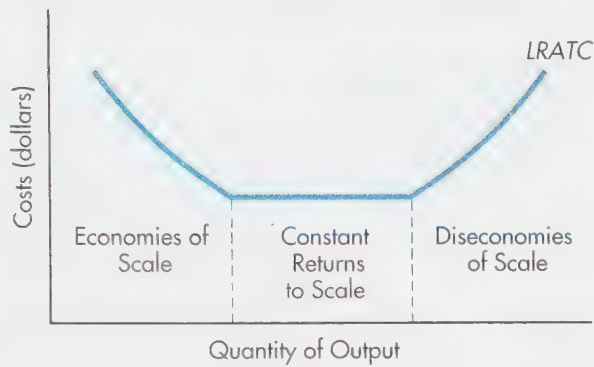
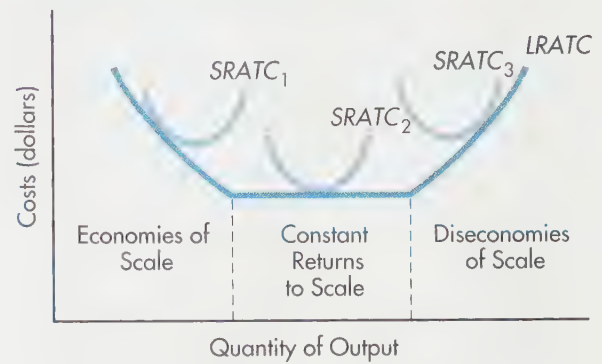
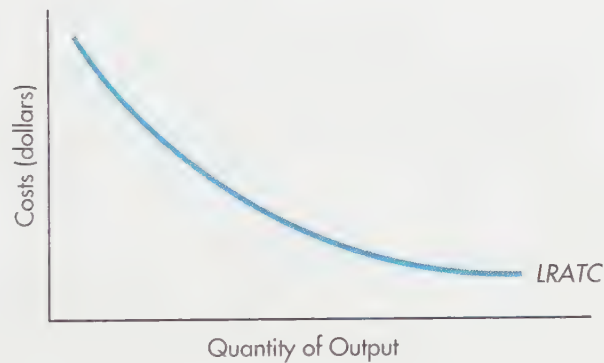
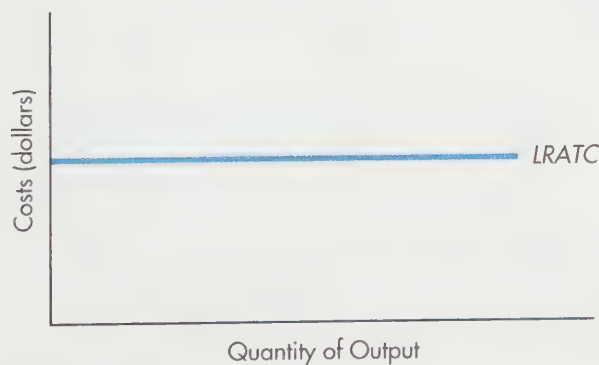
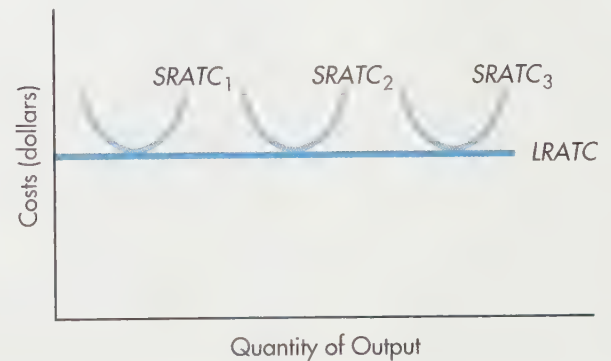
As a firm gets larger, its employees may be able to specialize based on comparative advantage, making the firm more efficient. Firms that can specialize more as they grow larger may be able to realize economies of scale. Specialization of marketing, sales, pricing, and research, for example, allows some employees to focus on research while others focus on marketing, and still others focus on sales and on pricing. For instance, when Mrs. Fields Cookies was just starting out, it was a one-person operation in northern California. When it moved to Park City, Utah, it was a multiperson operation with cookie outlets throughout most of the western United States. As it grew, the company was able to achieve economies of scale. Its employees could specialize more in just one activity, its advertising did not have to increase as its size increased, and larger machinery enabled it to produce a larger quantity of dough in a shorter period of time.

In 2001 and 2002, oil companies merged—Exxon and Mobil, Chevron and Texaco. The firms resulting from these combinations became two of the largest companies in the world. The reason for merging given by the chief executive officers of these companies was to achieve economies of scale. They believed that having larger oil fields and more refining capability would enable their employees to specialize more and their drilling and refining equipment to be more fully utilized. In 2005 and 2006, Verizon and MCI merged. The executives of these firms claimed that there would be economies of scale. Often the terminology is that there will be synergies that will come with a merger. Overlapping functions can be eliminated—for instance, there is no need for two accounting departments, one from Verizon and one from MCI. Also, MCI might be better at some task than Verizon, so the more efficient can be expanded and the less efficient eliminated. These synergies that arise from being larger, economies of scale, are the most common reason given for mergers.

Economies of scale may also result from the use of larger machines that are more efficient than smaller ones. Large blast furnaces can produce more than twice as much steel per hour as smaller furnaces, but they do not cost twice as much to build or operate. Large electric-power generators are more efficient (more output per quantity of resource) than small ones.

Size, however, does not automatically improve efficiency. The specialization that comes with large size often requires the addition of specialized managers. A 10 percent increase in the number of employees may require an increase of greater than 10 percent in the number of managers. A manager to supervise the other managers is needed. Paperwork increases. Meetings are held more often. The amount of time and labor that are not devoted to producing output grows. In other words, the overhead increases. In addition, it becomes increasingly difficult for the CEO to coordinate the activities of all the division heads and for the division heads to communicate with one another. In this way, size can cause diseconomies of scale. Inefficiencies that come from a larger bureaucracy are most often the reasons for diseconomies of scale.

Again, consider what happened to Mrs. Fields Cookies. As the company continued to add more and more outlets, its CEO could not keep track of everything. Assistant managers, vice presidents, and other executives were hired. The company had achieved economies of scale by utilizing larger equipment in its central location in Park City. But

**FIGURE 4** Long-Run and Short-Run Cost Curves**(a) Economies, Constant Returns, and Diseconomies****(d) Economies, Constant Returns, and Diseconomies****(b) Economies of Scale****(e) Economies of Scale****(c) Constant Returns to Scale****(f) Constant Returns to Scale**

In Figure 4(a), a U-shaped  $LRATC$  curve is shown. The downward-sloping portion is due to economies of scale, the horizontal portion to constant returns to scale, and the upward-sloping portion to diseconomies of scale. In Figure 4(b), only economies of scale are experienced. In Figure 4(c), only constant returns to scale are experienced. The  $LRATC$  curve connects the lowest cost for each level of output given by the  $SRATC$  curves. Three such short-run cost curves for each  $LRATC$  curve are illustrated in Figures 4(d), 4(e), and 4(f).



as more and more outlets were added at greater distances from Park City, the distribution of the cookie dough became more and more costly. At some size, most companies reach a point where diseconomies of scale set in. Mrs. Fields Cookies went beyond that point and eventually was sold, dismantled, and reorganized.

### 3.c. The Minimum Efficient Scale

The law of diminishing marginal returns applies to every resource, every firm, and every industry. Whether there are economies of scale, diseconomies of scale, constant returns to scale, or some combination of these depends on the industry under consideration. No law dictates that an industry will have economies of scale, eventually followed by diseconomies of scale, although that seems to be the typical pattern. Theoretically, it is possible for an industry to experience only diseconomies of scale, only economies of scale, or only constant returns to scale.

Most industries experience both economies and diseconomies of scale. As we noted earlier, Mrs. Fields Cookies was able to achieve economies of scale as it grew from one location to 700. But the company then faced diseconomies of scale because the cookie dough was produced at one location and distributed to the outlets in premixed packages. The dough factory was large, but the distribution of dough produced diseconomies of scale that worsened as outlets farther and farther away from the factory were opened.

If the long-run average-total-cost curve reaches a minimum, the level of output at which the minimum occurs is called the **minimum efficient scale (MES)**. The *MES* varies from industry to industry; it is significantly smaller, for instance, in the production of shoes than it is in the production of cigarettes. A shoe is made by stretching leather around a mold, sewing the leather, and fitting and attaching the soles and insoles. The process requires one worker to operate just two or three machines at a time. Thus, increasing the quantity of shoes made per hour requires more building space, more workers, more leather, and more machines. The cost per shoe declines for the first few shoes made per hour, but rises thereafter. Cigarettes, on the other hand, can be rolled in a machine that can produce several thousand per hour. Producing 100 cigarettes an hour is more costly per cigarette than producing 100,000 per hour.

#### minimum efficient scale (MES)

The minimum point of the long-run average-total-cost curve; the output level at which the cost per unit of output is the lowest.

### 3.d. The Planning Horizon

The long run is referred to as a planning horizon because the firm has not committed to a specific size. It has all options available to it. In determining the size or scale to select, the manager must look at expected demand and expected costs of production and then select the size that appears to be the most profitable. Once a scale is selected, the firm is operating in the short run, since at least one of the resources is fixed. If you look back at Figure 3(b), you see that the long-run average-total-cost curve does *not* connect the minimum points of each of the short-run average-total-cost curves ( $SRATC_1$ ,  $SRATC_2$ , and so on). The reason is that the minimum point of a short-run average-total-cost curve is not necessarily the lowest-cost method of producing a given level of output. For instance, point *A* on  $SRATC_3$  is much higher than point *B* on  $SRATC_4$ , but output level  $Q_4$  could be produced at either *A* or *B*. When the quantities of all resources can be varied, the choices open to the manager are much greater than when only one or a few of the resources are variable. The manager can select the lowest cost for a given output level in the long run.

## RECAP

1. Many industries are characterized by U-shaped long-run average-total-cost curves, but they need not be. There is no law dictating a U-shaped *LRATC* curve.

The law of diminishing marginal returns dictates the U shape of the short-run cost curves.

2. The long-run average-total-cost curve gets its U shape from economies and diseconomies of scale.
3. The minimum efficient scale (*MES*) is the output of a firm that is at the minimum point of a long-run average-total-cost curve.
4. The *MES* varies from industry to industry. Some industries, like the electric power distribution industry, have large economies of scale and a large *MES*. Other industries, like the fast-food industry, have a relatively small *MES*.
5. Economies of scale may result from specialization and technology. Diseconomies of scale may occur because coordination and communication become more difficult as size increases.
6. The long run is the planning period—the firm can select any size. Once a size is selected, contracts are signed, and resources are acquired, the firm is in the short run.

## SUMMARY

### 1. What is the law of diminishing marginal returns?

- According to the law of diminishing marginal returns, when successive equal amounts of a variable resource are combined with a fixed amount of another resource, there will be a point beyond which the extra or marginal product that can be attributed to each additional unit of the variable resource will decline. §1.b

### 2. What is the relationship between costs and output in the short run?

- Average total cost is the cost per unit of output—total costs divided by the quantity of output produced. §2.a
- The U shape of the short-run average-total-cost curve is due to the law of diminishing marginal returns. §2.a
- Marginal cost is the change in total cost divided by the change in output. §2.a.1
- Average total cost falls when marginal cost is less than average total cost and rise when marginal cost is greater than average total cost. Thus, the marginal-cost curve intersects the average-total-cost curve at the minimum point of the average total cost curve. §2.a.1
- Costs rise as a firm supplies more output. The law of diminishing marginal returns dictates that costs rise at a decreasing and then an increasing rate as output rises. §2.a, 2.b
- Fixed costs are costs that do not vary as the quantity of goods produced varies. §2.b

- Variable costs rise as the quantity of goods produced rises. §2.b
- Total costs are the sum of fixed and variable costs. §2.b
- The short run is a period of time just short enough that the quantity of at least one of the resources cannot be altered. §2.b

### 3. What is the relationship between costs and output in the long run?

- Everything is variable in the long run. §3
- Economies of scale occur when the size of the firm is doubled and the output that the firm can supply more than doubles. §3.a
- Diseconomies of scale occur when the size of the firm is doubled and the output that the firm can supply increases by less than double. §3.a
- The U shape of the long-run average-total-cost curve is due to economies and diseconomies of scale. §3.a
- Constant returns to scale occur when increases in output lead to no changes in unit costs and the quantities of all resources are variable. §3.a
- Specialization can lead to economies of scale—larger size enables people to specialize in the jobs where they use their comparative advantage. §3.b
- The minimum efficient scale (*MES*) occurs at the minimum point of the long-run average-total-cost curve. §3.c
- The long run is the planning horizon, where all resources are variable. Once a size or scale is selected, the firm is operating in the short run. §3.d

## KEY TERMS

average fixed cost (*AFC*), 150  
 average total cost (*ATC*), 147  
 average variable cost (*AVC*), 150  
 constant returns to scale, 153  
 diseconomies of scale, 153  
 economies of scale, 153

law of diminishing marginal returns, 146  
 long-run average-total-cost curve (*LRATC*), 152  
 marginal cost (*MC*), 147  
 minimum efficient scale (*MES*), 156

scale, 152  
 short-run average total cost (*SRATC*), 151  
 total costs (*TC*), 150  
 total fixed costs (*TFC*), 150  
 total variable costs (*TVC*), 150

## EXERCISES

- Use the following information to determine the total fixed costs, total variable costs, average fixed costs, average variable costs, average total costs, and marginal costs.

| Total Output | Costs | <i>TFC</i> | <i>TVC</i> | <i>AFC</i> | <i>AVC</i> | <i>ATC</i> | <i>MC</i> |
|--------------|-------|------------|------------|------------|------------|------------|-----------|
| 0            | \$100 |            |            |            |            |            |           |
| 1            | \$150 |            |            |            |            |            |           |
| 2            | \$225 |            |            |            |            |            |           |
| 3            | \$230 |            |            |            |            |            |           |
| 4            | \$300 |            |            |            |            |            |           |
| 5            | \$400 |            |            |            |            |            |           |

- Use the following table to answer the questions listed below.

| Total Output | Cost  | <i>TFC</i> | <i>TVC</i> | <i>AFC</i> | <i>AVC</i> | <i>ATC</i> | <i>MC</i> |
|--------------|-------|------------|------------|------------|------------|------------|-----------|
| 0            | \$ 20 |            |            |            |            |            |           |
| 10           | \$ 40 |            |            |            |            |            |           |
| 20           | \$ 60 |            |            |            |            |            |           |
| 30           | \$ 90 |            |            |            |            |            |           |
| 40           | \$120 |            |            |            |            |            |           |
| 50           | \$180 |            |            |            |            |            |           |
| 60           | \$280 |            |            |            |            |            |           |

- Calculate the total fixed costs, total variable costs, average fixed costs, average variable costs, average total costs, and marginal costs.
  - Plot each of the cost curves.
  - At what quantity of output does marginal cost equal average total cost and average variable cost?
- Using the table in exercise 1, explain what happens to *ATC* when  $MC > ATC$ ,  $MC < ATC$ , and  $MC = ATC$ .
  - Using the table in exercise 2, find the quantity where  $MC = ATC$ . Find the quantity where *ATC* is at its minimum. Find the quantity that is the most efficient operating point for the firm.
  - Describe some conditions that might cause large firms to experience inefficiencies that small firms would not experience.
  - What is the minimum efficient scale? Why would different industries have different minimum efficient scales?
  - Describe the relation between marginal and average costs. Describe the relation between marginal and average fixed costs and between marginal and average variable costs.
  - Explain why the *ATC* and *MC* curves are U-shaped.
  - Explain why the short-run marginal-cost curve must intersect the short-run average-total-cost curve at the minimum point of the *ATC*. Does the



- marginal-cost curve intersect the average-variable-cost curve at its minimum point? What about the average-fixed-cost curve? Why doesn't the marginal-cost curve also intersect the average-fixed-cost curve at its minimum point?
10. Why does the minimum point of the average-total-cost curve show the quantity at which the firm is most efficiently supplying output in the short run?
  11. Consider a firm with a fixed-size production facility as described by its existing cost curves.
    - a. Explain what would happen to those cost curves if a mandatory health insurance program is imposed on all firms.
    - b. What would happen to the cost curves if the plan required the firm to provide a health insurance program for each employee worth 10 percent of the employee's salary?
    - c. How would that plan compare to one that requires each firm to provide a \$100,000 group program that would cover all employees in the firm, no matter what the number of employees was?
  12. Does the following statement make sense? "You made a real blunder. The \$600 you paid for repairs is worth more than the car."
  13. Explain the statement, "We had to increase our volume to spread the overhead."
  14. Three college students are considering operating a tutoring business in economics. This business would require that they give up their current jobs at the student recreation center, which pay \$6,000 per year. A fully equipped facility can be leased at a cost of \$8,000 per year. Additional costs are \$1,000 a year for insurance and \$.50 per person per hour for materials and supplies. Their services would be priced at \$10 per hour per person.
    - a. What are fixed costs?
    - b. What are variable costs?
    - c. What is the marginal cost?
    - d. How many students would it take to break even?
  15. Express Mail offers overnight delivery to customers. It is attempting to come to some conclusion on whether to expand its facilities. Currently its fixed costs are \$2 million per month, and its variable costs are \$2 per package. It charges \$12 per package and has a monthly volume of 2 million packages. If it expands, its fixed costs will rise by \$1 million and its variable costs will fall to \$1.50 per package. Should it expand?
  16. Suppose the cost of starting Business A is very, very high. But once begun, the marginal cost of additional output is near zero. Draw this situation using the marginal cost curve.
  17. It requires a large sum of money to produce a musical CD. The band has to be formed, practiced, and so forth. The recording studio has to be rented and the music performed and taped. Once one CD has been created, it costs virtually nothing to produce additional CDs. Draw the average and marginal costs for this business.
- You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

# RUNNING OVER THE SAME OLD GROUND

I enjoy a robust debate. However, I am truly perplexed that the water industry in England appears to want to re-run all the arguments that were aired in Scotland when retail competition was implemented there. Can this really be in the interests of customers or investors? Perhaps this is only initial grandstanding, but it characterised both the recent City Conference and an event at Aston University.

This grandstanding, masquerading as analysis: ignored actual costs in Scotland (one-off and ongoing); asserted that there will be no economies of scale; asserted further that diseconomies of scope are likely; failed to recognise the benefits that are being achieved in Scotland; and claimed that investors will be disadvantaged by any competition. Professor Cave completed a thorough review of competition and innovation. Many of his ideas—customer engagement, refined incentives and encouraging innovation—are being pursued in Scotland. But his review can now be updated with actual costs from Scotland. If we update the Deloitte report referred to in last week's *Utility Week* using those figures, the consultant's scenario that previously showed a negative net present value of £423 million now has a positive value of £225 million. There is still a debate to be had about potential economies of scale and scope. There seems

to be overwhelming evidence on economies of scale. The market framework needs adjusting, not reinventing, to work across the whole of Great Britain. Set-up costs per customer will surely be much lower than they were in Scotland, where the two largest ongoing costs are operating the settlement and registration systems, and the regulator's levy for managing the framework. IT systems almost always have economies of scale and so do regulators. Efficient we may be, but our cost per customer is still higher than Ofwat's. Retail separation in the energy industry was followed by a series of mergers to take advantage of economies of scale. Why are the economics of customer service and billing in the water industry different? Economies of scope may be more open to debate. Others assert that separating retail must result in some loss of economies of scope, but present no evidence. I agree they are difficult to measure with any accuracy, but I am not aware of any negative impact in Scotland from separation. Indeed, Scottish Water's retail and wholesale businesses identified redundant activities that neither side wanted at separation. Given that the costs of wholesale and retail activities have fallen, economies of scope, if any, must be limited. Moreover, Bristol and Wessex operate a legally separate billing company; Glas Cymru tendered separately for retail serv-

ices; Vertex fulfilled this function at United Utilities; and many companies subcontract their call centre operations, meter reading, and other activities. It seems to me that the case that there are necessarily diseconomies of scope would need a lot of proving. As to benefits, the Water Industry Commission for Scotland recently reported on benefits for businesses and public sector organisations in Scotland. Glasgow City Council is saving about £1 million a year through the competitive framework, and households across Glasgow are £3 a year better off as a result. Further tenders are under way from organisations in both public and private sectors. These benefits are greater than anything Professor Cave assumed. We separated retail without adjusting Scottish Water's regulatory capital value or allowed for return, we made retailers responsible for bad debt and required them to pre-pay the wholesaler. The wholesale business becomes less risky, yet can earn the same return. The retail business has a higher return immediately on separation and can flourish by gaining customers or being sold to a rival. As such, it is difficult to see why investors—both debt and equity—would not benefit. By all means let's have a robust debate, but we do a disservice to customers and investors by ignoring the experience gained in Scotland.

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Source: Alan Sutherland, *Utility Week*, February 25, 2011.

**T**he article concerns the possible move from a government-controlled water industry to a competitively provided water industry in Great Britain. The crux of the article is captured in the following sentence: "This grandstanding, masquerading as analysis: ignored actual costs in Scotland (one-off and ongoing); asserted that there will be no economies of scale; asserted further that diseconomies of scope are likely; failed to recognise the benefits that are being achieved in Scotland; and claimed that investors will be disadvantaged by any competition." Let's look at each phrase.

**The phrase that actual costs in Scotland were ignored.** What the author is referring to is that the net present value of water services went from being negative prior to competition to positive after competition. Net present value is the comparison of costs and benefits each year for many years in the future. Then each year is presented in current dollar terms—this is what present value means.

**Economies and diseconomies of scale.** The advocates of continued government control argue that there are no economies of scale and will surely be

diseconomies of scale. Economies of scale are the reduction in per unit costs of producing and supplying water as the size or scale of the water enterprise increases. Diseconomies of scale are the increase in per unit costs of producing and supplying water as the size or scale of the water enterprise increases. The author notes that in Scotland there were large benefits from economies of scale—thus arguing against any future diseconomies of scale. He also notes that there is scant evidence of economies of scope. Economies of scope are the reduction in per unit costs when the enterprise gets large by moving into different activities. In particular, the relationship of retail and wholesale may create economies of scope when combined or may be more efficient if separated. The author believes that there are redundancies when separated that can be reduced if combined—that there are economies of scope—but has no hard evidence.

Allowing competition to prevail in the water industry drives costs down to their lowest possible level. As the author notes, the evidence in Scotland supports that theory—costs have been reduced, providing benefits to both businesses and consumers.



# The Mechanics of Going from Production to Costs

## 1. Output and Resources

The costs of producing and selling output depend on the productivity of resources. The more home runs a baseball player hits in a season, the more valuable he is as a resource. The more welding equipment an employee for Lincoln Electric can make each month, the more valuable he or she is as an employee. They are more valuable because they generate more money for their employers; the baseball team sells more tickets, and Lincoln Electric sells more equipment. The material in this chapter is based on the relationship between resources, output, and costs; in this appendix, we look more closely at this relationship.

### total physical product (TPP)

The maximum output that can be produced when successive units of a variable resource are added to fixed amounts of other resources.

### average physical-product (APP)

Output per unit of resource.

### marginal physical product (MPP)

The additional quantity that is produced when one additional unit of a resource is used in combination with the same quantities of all other resources.

The **total physical product (TPP)** (also called *total product*) schedule and curve show how the quantity of the variable resource (employees) and the output produced are related for a certain quantity of the fixed resource. In Figure 1(a), with total output measured on the vertical axis and the number of employees measured on the horizontal axis, the combinations of output and employees trace out the *TPP* curve. Both the table and the *TPP* curve in Figure 1(a) show that as additional units of the variable resource are used with a fixed amount of another resource, total output at first rises, initially quite rapidly and then more slowly, and then declines. As the first *MC* units of the variable resource (employees) are used, each additional employee can provide more output. But at some point, there are “too many chefs stirring the broth,” and each additional employee adds only a little to total output. Eventually, an additional employee actually detracts from the productivity of the other employees.

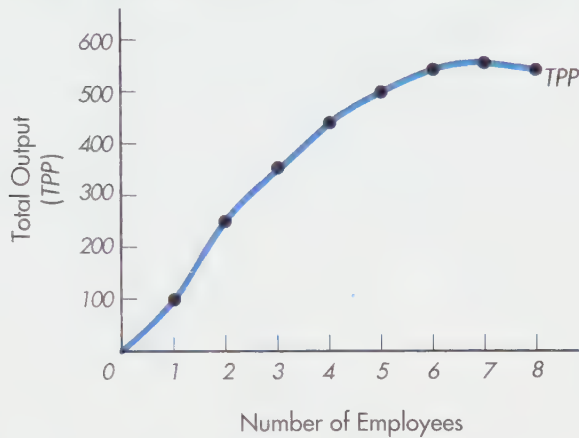
The law of diminishing marginal returns shows up more clearly with the average product and marginal-product curves, also called the **average physical product (APP)** and **marginal physical product (MPP)** curves. The average-product schedule is calculated by dividing total output by the number of employees:

$$APP = \frac{\text{total output}}{\text{number of employees}}$$

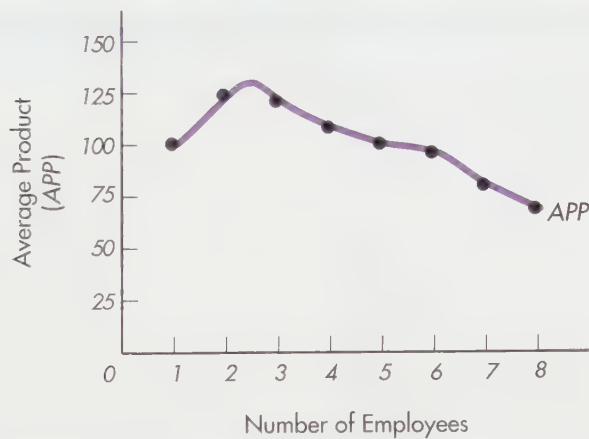
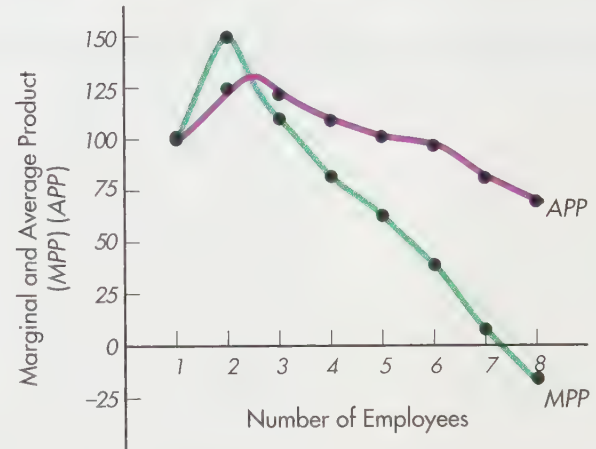
Plotting *APP* gives us Figure 1(b), a curve that rises quite rapidly and then slowly declines. The marginal-product schedule is the change in total output divided by the change in the quantity of variable resources (the number of employees):

$$MPP = \frac{\text{change in output}}{\text{change in number of employees}}$$

The *MPP* is shown in Figure 1(c); it is drawn with the *APP* curve so that we can compare *MPP* and *APP*. The *MPP* curve initially rises more rapidly than the *APP* curve, then falls more rapidly than *APP*, and eventually reaches zero. When *MPP* is zero or negative, the additional variable resources are actually detracting from the production of other resources, causing output to decline.

**FIGURE 1** Total, Average, and Marginal Product**(a) The Total Physical Product Curve**

| Number of Employees | Total Output | Average Physical Product | Marginal Physical Product |
|---------------------|--------------|--------------------------|---------------------------|
| 0                   | 0            | —                        | —                         |
| 1                   | 100          | 100                      | 100                       |
| 2                   | 250          | 125                      | 150                       |
| 3                   | 360          | 120                      | 110                       |
| 4                   | 440          | 110                      | 80                        |
| 5                   | 500          | 100                      | 60                        |
| 6                   | 540          | 90                       | 40                        |
| 7                   | 550          | 78.6                     | 10                        |
| 8                   | 540          | 67.5                     | -10                       |

**(b) The Average Physical Product Curve****(c) The Marginal Physical Product Curve**

The table provides plotting data for the graphs. Total, average, and marginal product schedules and curves are shown. The total physical product (*TPP*) schedule, shown in Figure 1(a), is derived by fixing one resource. The average physical product (*APP*) and marginal physical product (*MPP*) schedules are calculated from the total physical product schedule. Average is total output divided by number of employees; marginal is the change in the total output divided by the change in the number of employees.

You can see the relationship between *APP* and *MPP* in Figure 1(c). As long as the *MPP* is greater than the *APP*, the *APP* is rising; whenever the *MPP* is less than the *APP*, the *APP* is falling. Thus, the *MPP* and the *APP* are equal at the peak or top of the *APP* curve. This occurs at between two and three employees.

## 2. Productivity and Costs

The total-, average-, and marginal-physical-product schedules and curves show the relationship between quantities of resources (inputs) and quantities of output. To examine the costs of doing business rather than the physical production relationships, we must measure the costs of the resources and define how many resources are needed to supply output. This is done in Table 1. The cost per employee is \$1,000. We can calculate total costs by multiplying \$1,000 times the number of employees.

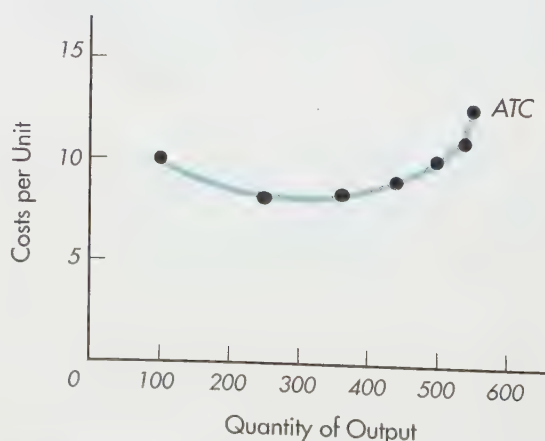
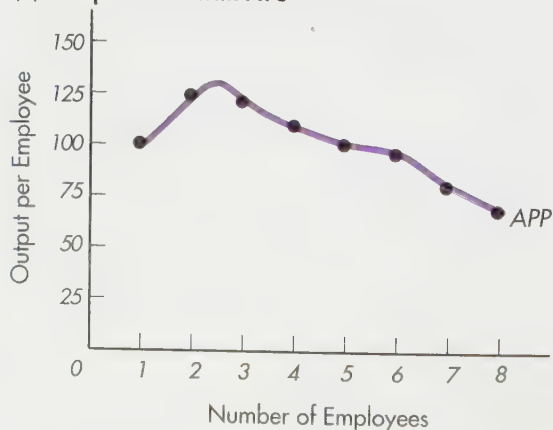
Notice that as output rises, costs also rise, but output rises by a larger amount at first and then by smaller and smaller amounts, whereas costs rise by a constant \$1,000. This means that the cost per unit, or average cost, falls and then rises. In addition, the incremental cost, or cost per additional unit of output, initially declines and then rises. This is shown in Figure 2(b).

In Figure 2(a), the *APP* and *ATC* curves are drawn. In Figure 2(b), the *MPP* and *MC* curves are drawn. Whereas the *MPP* and *APP* curves might be described as hump-shaped, the *MC* and *ATC* curves are described as U-shaped. The shapes are due to the law of diminishing marginal returns and what is measured on the axes. In the case of the *APP* and *MPP* curves, output is on the vertical axis and number of employees is on the horizontal axis. In the case of the *ATC* and *MC* curves, costs are on the vertical axis and output on the horizontal axis. You can see that the relationship between marginal

FIGURE 2 Average and Marginal Costs

| Quantity of Output | Total Cost | Average Cost | Marginal Cost |
|--------------------|------------|--------------|---------------|
| 100                | \$1,000    | \$10         | \$10          |
| 250                | \$2,000    | \$8          | \$6.7         |
| 360                | \$3,000    | \$8.33       | \$9.1         |
| 440                | \$4,000    | \$9          | \$12.5        |
| 500                | \$5,000    | \$10         | \$16.7        |
| 540                | \$6,000    | \$11.1       | \$25          |
| 550                | \$7,000    | \$12.7       | \$100         |

(a) Compare *APP* with *ATC*





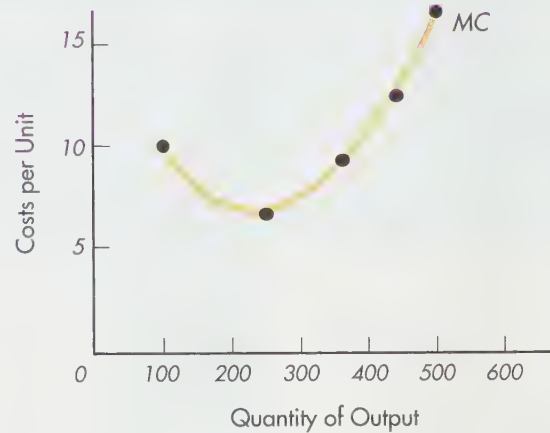
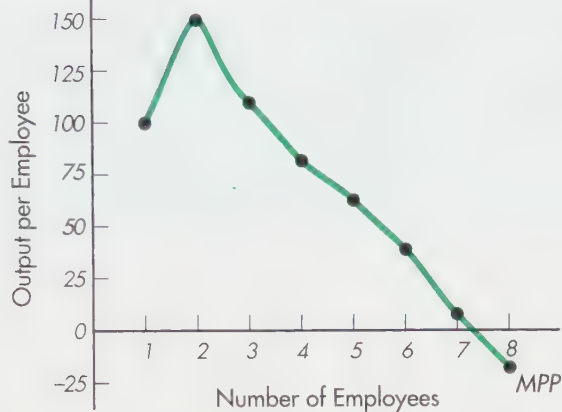
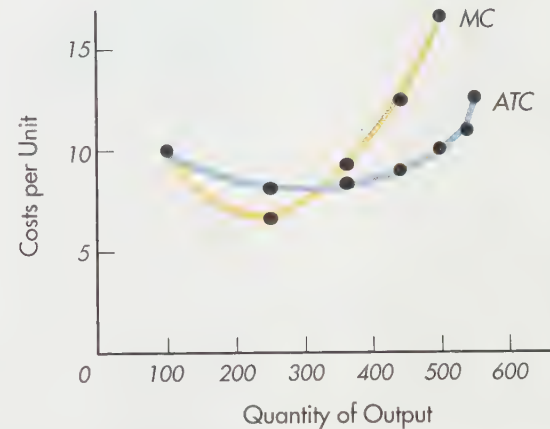
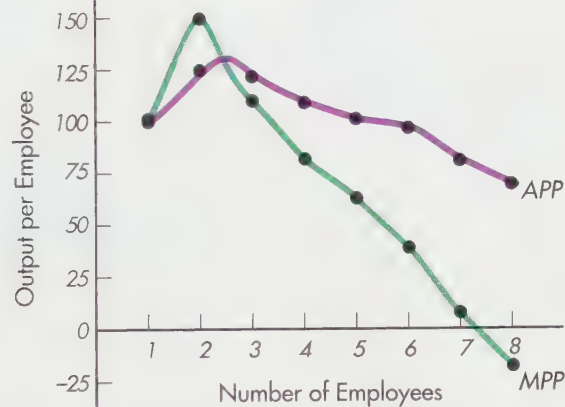
**FIGURE 2** Average and Marginal Costs (Continued)**(b) Compare  $MPP$  with  $MC$** **(c) Compare  $APP$ ,  $MPP$  with  $ATC$ ,  $MC$** 

Figure 2(a) shows the  $ATC$  curve and the  $APP$  curve. Figure 2(b) shows the  $MC$  curve and the  $MPP$  curve. The cost curves are described as U-shaped, and the product curves are described as hump-shaped. The shapes of the curves are due to the law of diminishing marginal returns. Figure 2(c) shows the relationship between average and marginal curves.

and average applies to both the product and the cost curves: Whenever the marginal is above the average, the average is rising, and whenever the marginal is below the average, the average is falling. Note also that  $MPP = APP$  at the maximum point of the  $APP$  curve, while  $MC = ATC$  at the minimum point on the  $ATC$  curve.

| Number of Employees | Total Output | Total Cost |
|---------------------|--------------|------------|
| 0                   | 0            | \$ 0       |
| 1                   | 100          | \$1,000    |
| 2                   | 250          | \$2,000    |
| 3                   | 360          | \$3,000    |
| 4                   | 440          | \$4,000    |
| 5                   | 500          | \$5,000    |
| 6                   | 540          | \$6,000    |
| 7                   | 550          | \$7,000    |

## SUMMARY

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1. The productivity curves—*TPP*, *APP*, and *MPP*—reflect the law of diminishing marginal returns. They show that as a variable resource is increased, output initially rises at an accelerating pace, then at a slower pace, and then may eventually decline. §1
2. The shape of the productivity curves and the U shape of the cost curves are the result of the law of diminishing marginal returns. §2

## KEY TERMS

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average physical product  
(*APP*), 162

marginal physical product  
(*MPP*), 162

total physical product  
(*TPP*), 162

## EXERCISES

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1. Explain the relationship between the shapes of the productivity curves and the shape of the cost curves. Specifically, compare the *APP* curve with the *ATC* curve and the *MPP* curve with the *MC* curve.

## CHAPTER 8

# Profit Maximization



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### FUNDAMENTAL QUESTIONS

- 1 How do firms decide how much to supply?
- 2 What is a market structure?
- 3 What is the difference between economic profit and accounting profit?
- 4 What is the role of economic profit in allocating resources?

**Y**ou start a business. To get it off the ground, you use your own money and perhaps the money of friends and relatives. Then you put in many hours to get the business on a successful footing. If the business provides enough to match what you could have earned working for someone else (taking into account the joy of owning your own business), you consider it a success. Similarly, when you purchase the stock of a publicly traded company, you are expecting that the firm will pay you more than you could have gotten using that money in another way. If it does, then the investment is a success. We measure the success of a business in terms of profit.



# 1. Profit Maximization

Economists assume that the primary goal of a (for-profit) business is to make a profit. Profit is total revenue less total costs. Total revenue is the quantity of goods and services sold multiplied by the price at which they are sold,  $PQ$ . So, profit =  $PQ$  – cost of land, labor, and capital.



1 How do firms decide how much to supply?

## 1.a. Calculation of Total Profit

Consider Table 1, in which column 1 is total output ( $Q$ ), column 2 is price ( $P$ ), column 3 is total revenue ( $TR$ ), and total cost ( $TC$ ) is listed in column 4. Profit, the difference between total revenue and total cost, is listed in column 5. For each row, column 4 is subtracted from column 3 to get profit. According to Table 1, profit is maximized if the firm supplies either 7 or 8 units of output.

**1.a.1. Marginal Revenue and Marginal Cost** Another way to discover the profit-maximizing quantity of output is to compare marginal revenue and marginal cost. Look at columns 6 and 7—the two are equal at quantity 8, the profit-maximizing quantity.

Why would marginal revenue equal marginal cost when profit is maximized? *Marginal cost* is the additional cost of producing one more unit of output. *Marginal revenue* is the additional revenue obtained from selling one more unit of output. If producing and selling one more unit of output increases costs less than it increases revenue—that is, if marginal cost is less than marginal revenue—then producing and selling that unit will increase profit. Conversely, if the production of one more unit costs more than the revenue obtained from the sale of the unit, then producing and selling that unit will decrease profit. When marginal revenue is greater than marginal cost, producing more will increase profit. Conversely, when marginal revenue is less than marginal cost,

TABLE 1 Profit Maximization

| 1<br>Total<br>Output<br>( $Q$ ) | 2<br>Price<br>( $P$ ) | 3<br>Total<br>Revenue<br>( $TR$ ) | 4<br>Total Cost<br>( $TC$ ) | 5<br>Profit<br>( $TR - TC$ ) | 6<br>Marginal<br>Revenue<br>( $MR$ ) | 7<br>Marginal<br>Cost ( $MC$ ) |
|---------------------------------|-----------------------|-----------------------------------|-----------------------------|------------------------------|--------------------------------------|--------------------------------|
| 0                               | \$1,900               | \$ 0                              | \$1,000                     | -\$1,000                     | —                                    | —                              |
| 1                               | \$1,700               | \$ 1,700                          | \$2,000                     | -\$ 300                      | \$1,700                              | \$1,000                        |
| 2                               | \$1,650               | \$ 3,300                          | \$2,800                     | \$ 500                       | \$1,600                              | \$ 800                         |
| 3                               | \$1,600               | \$ 4,800                          | \$3,500                     | \$1,300                      | \$1,500                              | \$ 700                         |
| 4                               | \$1,550               | \$ 6,200                          | \$4,000                     | \$2,200                      | \$1,400                              | \$ 500                         |
| 5                               | \$1,500               | \$ 7,500                          | \$4,500                     | \$3,000                      | \$1,300                              | \$ 500                         |
| 6                               | \$1,450               | \$ 8,700                          | \$5,200                     | \$3,500                      | \$1,200                              | \$ 700                         |
| 7                               | \$1,400               | \$ 9,800                          | \$6,000                     | \$3,800                      | \$1,100                              | \$ 800                         |
| 8                               | \$1,350               | \$10,800                          | \$7,000                     | \$3,800                      | \$1,000                              | \$1,000                        |
| 9                               | \$1,300               | \$11,700                          | \$9,000                     | \$2,700                      | \$ 900                               | \$2,000                        |

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producing more will lower profit. Thus, *profit is at a maximum when marginal revenue equals marginal cost*.<sup>1</sup>

Consider column 6 of Table 1, where marginal revenue is listed.

Marginal revenue = change in total revenue/change in total output

$$MR = \Delta TR / \Delta Q$$

Marginal revenue ( $MR$ ) is calculated by subtracting total revenue in column 3, row 1 from total revenue in column 3, row 2 and dividing that by the change in units of output from row 1 to row 2. Do this calculation for each pair of rows, and you derive marginal revenue.

It is important to understand the relationship between demand, price, and marginal revenue. The law of demand says that for a firm to increase the quantity it sells, the price has to be reduced. Consider Table 1 again. Notice that at a price of \$1,700, 1 unit of output is sold. Then, when the price is reduced to \$1,650, 2 units of output are sold: unit 1 at \$1,650 plus unit 2 at \$1,650 means total revenue of \$3,300. The firm did not sell the first unit at \$1,700 and then the second at \$1,650; it sold both at the lower price, \$1,650 each. Since total revenue changed from \$1,700 to \$3,300, marginal revenue is \$1,600. (Change in total revenue is  $\$3,300 - \$1,700 = \$1,600$ , and change in output is 1 unit.)  $MR = \$1,600$ , but the price is \$1,650. Because the firm had to set the price of units 1 and 2 at \$1,650 apiece in order to sell 2 units, it lost \$50 by reducing the price of the first unit from \$1,700 to \$1,650 and gained \$1,650 by selling the second unit. The marginal revenue is less than the price.

Column 7 of the table lists marginal cost. We know from the previous chapter that

Marginal cost = change in total cost/change in total output

$$MC = \Delta TC / \Delta Q$$

Marginal cost is calculated by subtracting the total cost in row 1 from that in row 2, and dividing that by the change in units of output.

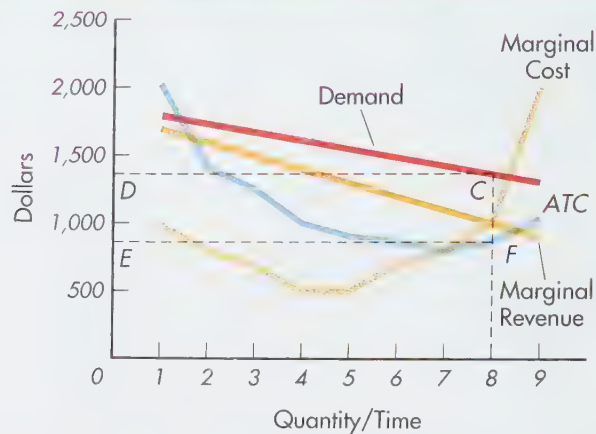
To summarize: Comparing marginal revenue and marginal cost determines whether the firm needs to supply more or less in order to maximize profit. The amount the firm should supply to maximize profit is indicated by the quantity at which marginal revenue equals marginal cost.

## 1.b. The Graphics of Profit Maximization

We now know that profit is maximized by finding the quantity where  $MR = MC$ . Let's show how this works graphically. We will use the cost curves derived in the previous chapter and put them together with the demand and marginal-revenue curves derived from Table 1 to illustrate how a firm maximizes profit. In Figure 1 we have drawn the demand and marginal-revenue curves and then added the average-total-cost and marginal-cost curves.

The profit-maximizing quantity of output is given by the quantity at which  $MR = MC$ . As shown in Figure 1, this occurs at quantity 8. If we then draw a vertical line up from the quantity 8 to the  $ATC$  curve, point F, we have identified the cost per unit of output. If we then draw a horizontal line from the  $ATC$  curve over to the axis, point E, we will have identified total cost, 08FE. This area is total cost, derived by multiplying the cost per unit of output, or  $ATC$ , by the number of units of output, 8. Because  $ATC$

<sup>1</sup> You might notice that profit is at the maximum level for quantities of 7 and 8 units. This occurs because we are dealing with integers, 1, 2, 3, and so on, when discussing output. There would be a unique quantity for which profit is at its maximum level if we could divide the quantities into very small units instead of having to deal with integers. That unique quantity would be where  $MR = MC$ . Thus, we always choose the quantity at which marginal revenue and marginal cost are the same as the profit-maximizing quantity.

**FIGURE 1** Profit Maximization

Demand and marginal revenue from Table 1 are plotted along with the ATC and MC curves from the previous chapter. The profit-maximizing quantity is given by where  $MR = MC$ . Profit is found by drawing a vertical line up from quantity 8 to ATC and then up to demand. A horizontal line from ATC over to the axis shows total cost, 08FE. Continuing the horizontal line to demand and then over to the axis shows total revenue, 08CD. Subtracting total cost from total revenue yields total profit, EFCD.

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is total cost divided by  $Q$ , multiplying it by  $Q$  just leaves total cost [ $ATC \times Q = (\text{total cost}/Q) \times Q = \text{total cost}$ ].

Back to the quantity of 8 and the vertical line up to the ATC curve. Now continue up to the demand curve point C. That identifies the price—it is the price that consumers will pay for that quantity. If we draw a horizontal line from the demand curve over to the axis, point D, we will have identified total revenue,  $P \times Q = 08CD$ . Subtracting total cost 08FE from total revenue 08CD leaves the area EFCD. This is total profit.

## RECAP

1. The profit-maximizing rule is to produce where marginal revenue equals marginal cost.
2. Firms will supply a quantity given by the equality between marginal revenue and marginal cost.

## 2. Selling Environments or Market Structure



- 2 What is a market structure?

Profit maximization occurs when marginal revenue equals marginal cost. This means that to identify the output level that a firm will supply, all we need to do is to identify its marginal revenue and marginal cost. This is actually not very difficult, since in the short run every firm, no matter what its size, no matter what its location, and no matter what it does, has a relationship between costs and output dictated by the law of diminishing marginal returns. Thus, the cost curves can have only one shape—the U shape. The marginal-cost curve is a U-shaped curve with output on the horizontal axis and costs on the vertical axis.

The shape of the marginal-revenue curve depends on the shape of the demand curve. The shape of the demand curve, essentially the price elasticity of demand, depends on the number of substitutes, the importance of the good or service in the

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consumer's budget, and the length of time being considered. These factors are defined by the type of selling environment in which a firm operates. Economists have classified selling environments into four basic models. These are perfect competition, monopolistic competition, oligopoly, and monopoly.

## 2.a. Characteristics of the Market Structures

The selling environment in which a firm produces and sells its product, called a *market structure*, is defined by three characteristics:

- The number of firms that make up the market. In some industries, such as agriculture, there are hundreds of individual firms. In others, such as the photofinishing supplies industry, there are very few firms.
- The ease with which new firms may enter the market and begin producing the good or service. It is relatively easy and inexpensive to enter the desktop publishing business, but it is much more costly and difficult to start a new airline.
- The degree to which the products produced by the firms are different. Firms may sell identical products—wheat is wheat no matter which farm it comes from—or differentiated products—McDonald's Big Mac is not identical to Jack-in-the-Box's sirloin burger.

Table 2 summarizes the characteristics of the four market structures.

**2.a.1. Perfect Competition** Perfect competition is a market structure characterized by the following:

- A very large number of firms, so large that whatever any *one* firm does has no effect on the market
- Firms that produce an identical product (perfect substitutes)
- Easy entry

In perfect competition, a very large number of firms in the market means that consumers have many options when they are deciding where to purchase the good or service, and there is no cost to the consumer of going to a different seller. In this market structure, the product is identical, so consumers do not prefer one seller to another or one brand to another. In fact, there are no brands—only identical, generic products. The large number of sellers also means that any one seller is a very small part of the market, and so its actions will not affect the others. A single firm can sell everything it wants to at the market price, but it cannot try to increase price, and it won't lower price. If a single small firm tried to raise the price even a very small amount, consumers would simply switch to another seller because consumers have a perfectly elastic demand—why pay even a penny more if you can simply turn around and get the identical item for a penny less? This situation is illustrated with a demand curve that is a horizontal line, as shown

**TABLE 2** Characteristics of Market Structures

| Market Structure         | Number of Firms   | Entry Condition   | Product Type                   |
|--------------------------|-------------------|-------------------|--------------------------------|
| Perfect competition      | Very large number | Easy              | Standardized                   |
| Monopoly                 | One               | No entry possible | Only one product               |
| Monopolistic competition | Large number      | Easy              | Differentiated                 |
| Oligopoly                | Few               | Impeded           | Standardized or differentiated |

in Figure 2(a). Notice that when price goes above the existing market price, demand disappears—there is no demand except at that one price.

### 2.a.2. Monopoly Monopoly is a market structure in which:

- There is just one firm.
- Entry by other firms is not possible.

In a monopoly, because there is only one firm, consumers have only one place to buy the good, and there are no close substitutes. The monopolist can do anything it wants, since consumers cannot go to another seller—anything, that is, as long as it earns a profit.

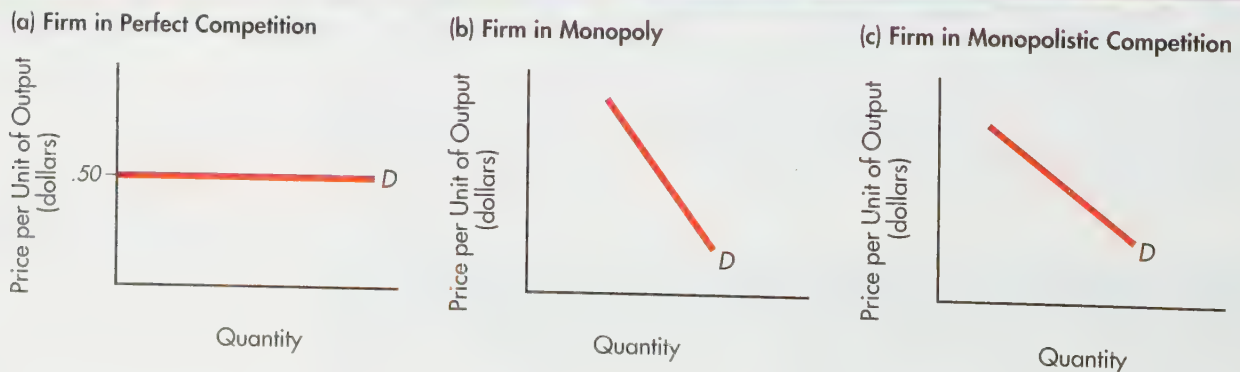
The demand curve facing the single firm in a monopoly is the market demand because the firm is the only supplier in the market. This is shown in Figure 2(b). Being the only producer, the monopolist must carefully consider what price to charge. Unlike a price increase in a perfectly competitive market, a price increase in a monopoly will not drive every customer to another producer. But if the price is too high, consumers will not buy the product. Even if a monopolist had something that was needed—say, insulin or gasoline or electricity—consumers would quit buying it if the price got too high.

### 2.a.3. Monopolistic Competition A monopolistically competitive market structure is characterized by the following:

- A large number of firms
- Easy entry
- Differentiated products

Product differentiation distinguishes a perfectly competitive market from a monopolistically competitive market. (In both, entry is easy and there are a large number of firms.) Even though there are many firms in a monopolistically competitive market structure, the demand curve faced by *any one firm* slopes downward, as in Figure 2(c). Because each product is slightly different from all other products, each firm is like a mini-monopoly—the only producer of that specific product. The greater the differentiation among products, the less price-elastic the demand.

**FIGURE 2** The Demand Curve Facing an Individual Firm



The demand curve for an individual firm in perfect competition is a horizontal line at the market price, as shown in Figure 2(a). Figure 2(b) shows the market demand, which is the demand curve faced by a monopoly firm. The firm is the only supplier and thus faces the entire market demand. Figure 2(c) shows the downward-sloping demand curve faced by a firm in monopolistic competition. The curve slopes downward because of the differentiated nature of the products in the industry.

### 2.a.4. Oligopoly In an oligopoly:

- There are few firms—more than one, but few enough so that each firm alone can affect the market.
- Products can be either differentiated or identical. Automobile producers constitute one oligopoly, steelmakers another.
- Entry is more difficult than entry into a perfectly competitive or monopolistically competitive market, but in contrast to monopoly, entry can occur.
- Firms are *interdependent*, and this interdependence distinguishes oligopoly from the other selling environments.

The oligopolist faces a downward-sloping demand curve, but the shape of the curve depends on the behavior of competitors. Oligopoly is the most complicated of the market structure models to examine because there are so many behaviors that firms might display. Because of its diversity, many economists describe oligopoly as the most realistic of the market structure models.

### 2.b. Demand and Profit Maximization

Does a perfectly competitive firm maximize profit in a different manner from a monopolist or a monopolistically competitive firm? The answer is not really. Each firm maximizes profit by finding the quantity where marginal revenue equals marginal cost ( $MR = MC$ ) and then setting the price according to demand. The difference is that for a perfectly competitive firm, demand is a horizontal line—it is perfectly elastic. For the perfectly competitive firm, the only decision is what quantity to produce. The output choice of the perfectly competitive firm is shown in Figure 3(a). The perfectly elastic demand, a horizontal line at the market price,



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A cab driver in Tokyo dusts the rear seat of his cab prior to picking up passengers. Taxicabs are tightly regulated in Japan, having to serve specific districts and maintain specified quality standards. A particular company may have a government-created monopoly in a certain part of the city. Nevertheless, each cab company attempts to compete with other cab and limousine companies by providing extra service. Cleanliness and order are emphasized. Many cab drivers wear white gloves; others use feather dusters on the seats before each customer enters the cab; still others provide special music and other services.



*Profit is maximized at the output level where marginal revenue and marginal cost are equal ( $MR = MC$ ).*

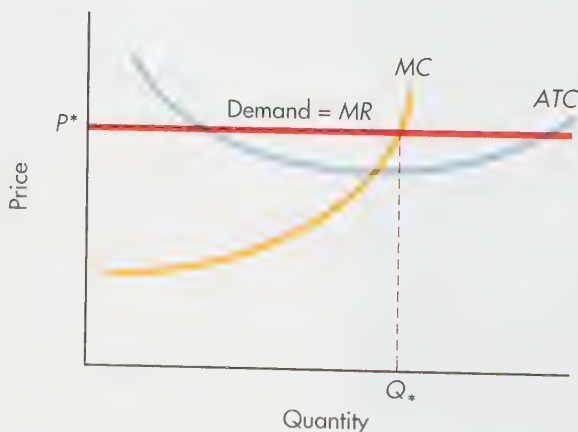
means that marginal revenue, demand, and price are the same. For firms that have a downward-sloping demand curve, marginal revenue lies below demand, as shown in Figure 3(b). Thus, the process of determining the profit-maximizing quantity of output to offer for sale is to find the quantity where  $MR = MC$  and then determine what price consumers are willing and able to pay to purchase the quantity of output offered by the firm (tracing a vertical line up to demand, shown in Figure 3[b]). That price is the profit-maximizing price,  $P^*$ .

## RECAP

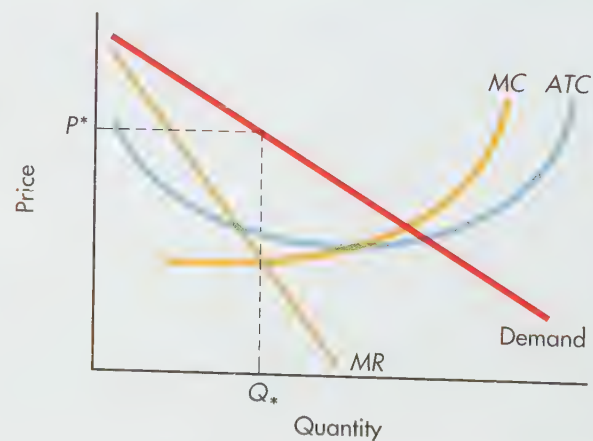
1. Economists have identified four market structures: perfect competition, monopoly, monopolistic competition, and oligopoly.
2. Perfect competition is a market structure in which many firms are producing a nondifferentiated product and entry is easy. The demand curve for a perfectly competitive firm is a horizontal line at the market price.  $P = MR$ .
3. Monopoly is a market structure in which only one firm supplies the product and entry cannot occur. Demand is downward sloping, and the marginal-revenue curve lies below the demand curve.  $P > MR$ .
4. Monopolistic competition is a market structure in which many firms are producing differentiated products and entry is easy. The demand curve is downward sloping, and marginal revenue is less than demand and less than price.  $P > MR$ .
5. Oligopoly is a market structure in which a few firms are producing either standardized or differentiated products and entry is possible but not easy. The distinguishing characteristic of oligopoly is that the firms are interdependent. The shape of the demand curve depends on how the firms interact—what form their interdependence takes.

**FIGURE 3** Choosing Price and Quantity to Maximize Profit

(a) Perfect Competition—Horizontal Demand



(b) Downward-Sloping Demand



As shown in Figure 3(a), when the firm is perfectly competitive and demand for its goods is perfectly elastic, the demand and marginal revenue are the same. The firm maximizes profit by finding the quantity where  $MR = MC$  and the price is the same as  $MR$ . As shown in Figure 3(b), when the firm is not perfectly competitive, the demand for its goods slopes down. As a result, marginal revenue is less than demand. The firm maximizes profit by finding the quantity where  $MR = MC$  and then setting the price according to demand.

### 3. Measuring Economic Profit

We now know the mechanics of maximizing profit: Find the quantity where marginal revenue equals marginal cost, determine the price, and then subtract total cost from total revenue. Now let's be sure we understand what profit is. There are two measures of profit: accounting profit and economic profit.



**3** What is the difference between economic profit and accounting profit?

#### 3.a. Calculating Profit

**Accounting profit** is net operating income, or

$$\text{Accounting profit} = PQ - \text{cost of land} - \text{cost of labor} - \text{cost of capital}$$

The difference between accounting profit and economic profit is the last term, cost of capital. Accounting profit measures the cost of capital as interest expense only. It does not include the cost of ownership, called **equity capital**. **Economic profit** includes all opportunity costs:

$$\text{Economic profit} = \text{accounting profit} - \text{cost of equity capital}$$

To illustrate the difference between accounting profit and economic profit, let's look at a sole proprietorship, a pet grooming business. The owner of the business, Roberto Brawning, left his job at Intel, where he earned \$80,000 a year, to start the pet grooming business. He used \$50,000 of his own money and a loan of \$100,000, which he agreed to pay back with 7 percent interest. His business is bringing in \$100,000 a year. Brawning has rent and labor expenses of \$30,000. So with the interest expense of \$7,000 = (7%)(\\$100,000), Brawning's accounting profit is

$$\$100,000 - \$30,000 - \$7,000 = \$63,000$$

This does not include all of Brawning's opportunity costs, since he gave up the job with Intel and he used \$50,000 of his own money. He could have used this \$50,000 for anything else—such as buying stock in Microsoft. Suppose Brawning's highest-valued alternative would have returned 8 percent to him last year. It is necessary to account for this \$4,000 (8% × \$50,000) as well as the \$80,000 job he gave up to give a true picture of the success of the grooming business. This is what economic profit does. Brawning's economic profit is

$$\begin{aligned} \text{Accounting profit} - \text{cost of ownership:} \\ \$63,000 - \$4,000 - \$80,000 = -\$21,000 \end{aligned}$$

Brawning is actually earning a negative economic profit. He is not earning enough to pay all of his opportunity costs. If we changed the example slightly and said that Brawning really enjoys running his own business and puts a value of \$28,000 on that enjoyment, then we must add that to the \$100,000 the grooming business makes in revenue. In this case, the economic profit would be positive, \$7,000.

Accounting profit is always equal to or greater than economic profit. It is possible for economic profit to be negative and accounting profit positive, as in the previous example. Only if there are no equity costs are economic and accounting profit the same; otherwise accounting profit is larger than economic profit.

$$\text{Economic profit} = \text{accounting profit} - (\text{cost of equity})(\text{amount of equity})$$

**accounting profit**

Net operating income.

**equity capital**

Ownership; funds investors or owners put into a firm.

**economic profit**

Accounting profit minus the cost of equity capital.

The calculation of accounting and economic costs is essentially the same for a large, publicly traded company as it is for the pet grooming business. Consider the following data taken from General Motors' annual income statement.

| General Motors   | Millions of Dollars |
|------------------|---------------------|
| Sales            | 193,518             |
| Expenses         | 178,813             |
| Interest expense | 11,900              |
| Net income       | 2,805               |
| Cost of equity   | 44,235              |

According to the income statement, GM's accounting profit (called net income) is a positive \$2,805 million. But to get a true picture of GM's performance, subtract the cost of equity capital:

$$\$2,805 - \$44,835 = -\$42,030$$

Economic profit is negative. So even though GM created a positive accounting profit this year, it did not earn enough to pay the opportunity cost of capital. In 2011, GM was generating a positive accounting profit but a negative economic profit. In 2008, GM was not even generating a positive accounting profit. Obviously, if accounting profit is negative, economic profit is negative. GM went into bankruptcy in 2009.

### 3.b. The Role of Economic Profit

Accounting profit is the number reported in financial pages and on financial news. But accounting profit provides very little useful information. Economic profit is a signal indicating whether resources would have a higher value in another use. When economic profit is negative, resources flow elsewhere; when it is positive, resources flow to the activity creating the profit.

#### negative economic profit

Total revenue is less than total costs, including opportunity costs.



- 4 What is the role of economic profit in allocating resources?

**3.b.1. Negative Economic Profit** **Negative economic profit** means that the resources used would have a higher value in another use. If total revenue does not pay for all costs, then owners don't get paid for their time, effort, and investments. When this occurs, the owners take their money and time and go elsewhere. If the economic profit of the pet grooming business is negative, the owner is not earning enough to pay for all of the opportunity costs. He would be better off selling the business or selling pieces of it and going to work for someone else. This is exactly the same as with GM. In fact, GM discontinued the Oldsmobile brand in 2004 and sold assets including stakes in Fiat and Fuji Heavy Industries (Subaru), as well as its locomotive manufacturing business, in 2005. In 2008 and 2009, GM asked for subsidies from the federal government because its economic profit was so negative that its executives were not sure the company could remain in business. In 2009, GM went into bankruptcy.

**3.b.2. Zero Economic Profit** When total revenue exactly equals total cost, the firm is just breaking even—economic profit is zero. **Zero economic profit** might sound bad, but it is not. A zero economic profit simply means that the owners could not have expected to have done better elsewhere. The investors have no incentive to sell their business and purchase something else, since they would expect to earn no more than they are currently earning. Remember, accounting profit is greater than economic profit, so even if economic profit is zero, accounting profit is positive. The accounting profit that occurs when economic profit is zero is called **normal profit**.

#### zero economic profit

Total revenue equal to total costs, including opportunity costs.

#### normal profit

The accounting profit that corresponds to a zero economic profit.



**3.b.3. Positive Economic Profit** When total revenue is greater than total cost, the firm is said to be earning **positive economic profit**. Positive economic profit is a powerful signal in the marketplace. Whenever other investors see the positive economic profit, they want to get in on it as well. As a result, they take their funds from whatever use they are currently in and invest them in existing and new firms that will compete with the profitable firm.

Recall from Chapter 3 the scenario of the bottled water that was carried to the top of a hiking trail and sold to thirsty hikers. As more hikers showed up than there were water bottles available, stand owners were induced to increase supplies to earn greater profits, and new owners were prompted to open their own water stands. With additional firms producing the good or service, the supply increases; this will lower the price of that good or service and reduce the positive economic profit. The entry of new firms will stop once economic profit is zero.

**positive economic profit**

Total revenue in excess of total costs, including opportunity costs.

## RECAP

1. Economic profit refers to the difference between total revenue and the full cost of inputs.
2. Accounting profit is total revenue less total costs but does not include the opportunity cost of the owner's capital.
3. Economic profit is accounting profit less the opportunity cost of the owner's capital.
4. Economic profit can be positive, negative, or zero. A positive economic profit means that the revenue exceeds the full cost of inputs, that is, that inputs are earning more than their opportunity costs. A negative economic profit means that the inputs are not earning their opportunity costs. A zero economic profit means that the inputs are just earning their opportunity costs.
5. Accounting profit is greater than economic profit. Normal profit is the accounting profit when economic profit is zero.

## SUMMARY

### 1. How do firms decide how much to supply?

- The supply rule for all firms is to supply the quantity at which the firm's marginal revenue and marginal cost are equal. §1.a.1

### 2. What is a market structure?

- A market structure is a model of the producing and selling environments in which firms operate. The three characteristics that define market structure are the number of firms, the ease of entry, and whether the products are differentiated. §2.a
- A perfectly competitive market is a market in which a very large number of firms are producing an identical product and entry is easy. §2.a.1

- The demand curve facing a perfectly competitive firm is a horizontal line at the market price.  $Price = MR$ . §2.a.1

- A monopoly is a market in which there is only one firm and entry by others cannot occur. §2.a.2

- The demand curve facing a monopolist is the market demand, since there is only one firm. The demand curve slopes down.  $Price > MR$ . §2.a.2

- A monopolistically competitive market is a market in which a large number of firms are producing differentiated products and entry is easy. §2.a.3

- The demand curve facing a monopolistically competitive firm is downward sloping because of the differentiated nature of the products offered by the firm. §2.a.3
  - An oligopoly is a market in which a few firms are producing either differentiated or nondifferentiated products and entry is possible but not easy. §2.a.4
  - The shape of the demand curve facing a firm in an oligopoly depends on how the firms interact. §2.a.4
  - The marginal-revenue curve for all firms except those in perfect competition is downward sloping and lies below the demand curve. The marginal-revenue curve for the perfectly competitive firm is the same as the demand curve, a horizontal or perfectly elastic curve. §2.b
3. What is the difference between economic profit and accounting profit?
- Accountants measure only the direct costs. Economists measure all opportunity costs. §3.a
  - Accounting profit is total revenue – cost of land, labor, and capital. Cost of capital is interest expense only. §3.a
  - Economic profit is accounting profit – cost of ownership. §3.a
4. What is the role of economic profit in allocating resources?
- Economic profit indicates whether resources will remain in their current activity or be distributed to a different activity. When economic profit is positive, all resources, including the firm's investors and owners, are getting paid more than they could have expected to get in another activity. Others seeing this will redirect their time and investments to that activity. Conversely, when economic profit is negative, all resources are not getting paid their opportunity costs. Resource owners will take their resources and place them into an activity that promises to pay more. §3.b.3

## KEY TERMS

accounting profit, 175  
economic profit, 175  
equity capital, 175

negative economic profit, 176  
normal profit, 176  
positive economic profit, 177

zero economic profit, 176

## EXERCISES

1. Use the following to calculate profit at each quantity of output.

| (Total) Output<br>(Q) | Price<br>(P) | Total<br>Revenue<br>(TR) | Total Cost<br>(TC) |
|-----------------------|--------------|--------------------------|--------------------|
| 0                     | \$1,900      | \$ 0                     | \$1,000            |
| 1                     | \$1,700      | \$ 1,700                 | \$2,000            |
| 2                     | \$1,650      | \$ 3,300                 | \$2,800            |
| 3                     | \$1,600      | \$ 4,800                 | \$3,500            |
| 4                     | \$1,550      | \$ 6,200                 | \$4,000            |
| 5                     | \$1,500      | \$ 7,500                 | \$4,500            |
| 6                     | \$1,450      | \$ 8,700                 | \$5,200            |
| 7                     | \$1,400      | \$ 9,800                 | \$6,000            |
| 8                     | \$1,350      | \$10,800                 | \$7,000            |
| 9                     | \$1,300      | \$11,700                 | \$9,000            |

2. Use the table in exercise 1 to calculate marginal revenue and marginal cost.
3. Use the information in exercises 1 and 2 to graphically show maximum profit. Label the profit-maximizing quantity and price, total cost, total revenue, and profit.
4. Can accounting profit be positive and economic profit negative? Can accounting profit be negative and economic profit positive? Explain.
5. Use the following information to calculate accounting profit and economic profit.

Sales \$100

Employee expenses \$40

Inventory expenses \$20

Value of owner's labor in any other enterprise \$40

6. Calculate accounting profit and economic profit for each of the following firms (amounts are in millions of dollars).

|                    | <b>General<br/>Motors</b> | <b>Barclays<br/>Bank</b> | <b>Microsoft</b> |
|--------------------|---------------------------|--------------------------|------------------|
| Sales              | \$50,091                  | \$5,730                  | \$2,750          |
| Wages and salaries | \$29,052                  | \$3,932                  | \$ 400           |
| Cost of capital    | \$12,100                  | \$ 750                   | \$ 35            |
| Interest on debt   | \$ 7,585                  | \$ 275                   | \$ 5             |
| Cost of materials  | \$ 6,500                  | \$ 556                   | \$1,650          |

7. Which type of market characterizes most businesses operating in the United States today?
8. Given that a firm in a monopoly has no competitors producing close substitutes, does the monopolist set exorbitantly high prices?
9. Give 10 examples of differentiated products. Then list as many nondifferentiated products as you can. Which would have the largest price elasticity of demand, the differentiated or the nondifferentiated goods?
10. Describe profit maximization in terms of marginal revenue and marginal cost.
11. Use the information in the table to calculate total revenue, marginal revenue, and marginal cost. Indicate the profit-maximizing level of output. If the price was \$3 and fixed costs were \$5, what would variable costs be? At what level of output would the firm produce?

| <b>Output</b> | <b>Price</b> | <b>Total Costs</b> |
|---------------|--------------|--------------------|
| 1             | \$5          | \$10               |
| 2             | \$5          | \$12               |
| 3             | \$5          | \$15               |
| 4             | \$5          | \$19               |
| 5             | \$5          | \$24               |
| 6             | \$5          | \$30               |
| 7             | \$5          | \$45               |

12. Try to classify the following firms into one of the four market structure models. Explain your choice.
- Rowena's gourmet foods (produces and sells a line of specialty foods)
  - Shasta Pools & Spas (swimming pool and spa building)
  - Merck (pharmaceuticals)
  - US Airways
  - UDC Homes (builders)
  - Legal Sea Foods (restaurant chain)
13. Draw a demand curve and the corresponding marginal-revenue curve for a firm selling in a monopoly and another firm selling in perfect competition. Explain which demand curve is the most elastic. What does this mean for the marginal-revenue curve?
14. Explain why accounting profit provides very useful information. Explain why economic profit provides very useful information.
15. GM's net income in 2010 was \$4.7 billion. What would its accounting profit be if its cost of equity capital was \$5 billion? What would its economic profit be if its cost of equity capital was \$5 billion?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



# UBS GETS TIGHT-FISTED ON EXECUTIVE BONUSES

*The Daily Telegraph (London), November 18, 2008*

**U**BS has become the first major bank to overhaul executive compensation in an effort to prevent a repeat of past mistakes and ensure its highly paid bankers act in the long-term interests of the group.

In a radical break with tradition and setting the tone for possible changes to executive remuneration in the UK, UBS will in future claw back bonuses under a new "malus"—or negative bonus-system if the Swiss lending giant underperforms.

To ensure funds are recoverable, two-thirds of all cash bonuses will be held in escrow accounts for at least a year after payment. Share-based bonuses will not vest for three years, and executives will be "obliged to hold three quarters of their vested shares (after paying taxes) for several more years," UBS said. The same malus system will apply.

UBS is also stamping out "rewards for failure." Notice periods for executives are being reduced from 12 to six months, and pay-offs calculated against base salary and cash bonus alone—excluding any equity incentives. All bonuses paid on departure will be subject to the malus system.

"This should prevent any payments that prove to be inappropriate in the near future," the bank said. The new structure will filter down to "the so-called risk takers," the bank added.

Bankers' bonuses have been blamed for causing the financial crisis by neglecting long-term stability, and UBS's new model may be used as a template for planned remuneration reforms in the UK.

One key change is a shift to measuring performance against economic profit—a risk-weighted approach that accounts for the cost of risk capital. Economic profit will replace earnings per

share targets, which can be flattered by non-trading actions such as share buy-backs. As now, bonuses will also reflect total shareholder return—share price improvement plus dividends paid.

UBS has been under intense scrutiny since requiring a Sfr60bn (pounds 33bn) Swiss state bail-out.

Three former UBS executives blamed for loading the bank with \$46bn (pounds 30bn) of "toxic" debt are yet to receive Sfr60.6m they were awarded in pay-offs last year. Chairman Peter Kurer and chief executive Marcel Rohner have pledged to forgo all bonuses this year.

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**Source:** The Daily Telegraph (London) November 18, 2008, Philip Aldrick, © Telegraph Media Group Limited 2008.

**I**n the 1980s, firms decided to link executive bonuses with profits. The problem was that the linkage was to accounting profits rather than economic profits. Why does this matter? Because while accounting profits may be positive, if the cost of capital is taken into account, economic profits may be negative. The cost of capital is the opportunity cost of the money invested in a firm. If this is not included, then the profits reported for a firm are misleading.

If firms want to incentivize executives to allocate resources efficiently—to their highest valued

use—the firms must link economic profit to compensation. According to the article, this is what UBS is doing. It is doing so in response to the huge bonuses paid or promised to executives who performed poorly in terms of economic profit. It is also basing the compensation on a longer time period than just one year. As we noted in the chapter in discussing GM, economic profit one year may be positive and another year negative; it is the long-term generation of economic profits that means success, not the performance of a single year.

# Perfect Competition



## FUNDAMENTAL QUESTIONS

- 1 What is perfect competition?
- 2 What does the demand curve facing the individual firm look like, and why?
- 3 How does the firm maximize profit in the short run?
- 4 At what point does a firm decide to suspend operations?
- 5 When will a firm shut down permanently?
- 6 What is the break-even price?
- 7 What is the firm's supply curve in the short run?
- 8 What is the firm's supply curve in the long run?
- 9 What are the long-run equilibrium results of a perfectly competitive market?



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**T**he market structure of perfect competition is a model that is intended to capture the behavior of firms when there are a great many competitors offering a virtually identical product. It also captures what is known as a commodity. As we will see, there are many items that have become commoditized or are sold in a market that looks quite a bit like the model of perfect competition.



# 1. The Perfectly Competitive Firm in the Short Run

We begin our analysis of perfect competition by taking the viewpoint of an individual firm that is currently in business, having already procured the necessary land, tools, equipment, and employees to operate the firm. After we discuss how much the firm produces and at what price it sells its products, we discuss the entry and exit processes. We examine how someone begins a business and how someone leaves or exits a business. We then alter our perspective and look at the market as a whole. Let's start our discussion by reviewing the characteristics of a perfectly competitive market.

## 1.a. The Definition of Perfect Competition

A market that is perfectly competitive exhibits the following characteristics:

1. There are many sellers. No one firm can have an influence on market price. Each firm is such a minute part of the total market that however much the firm produces—nothing at all, as much as it can, or some amount in between—it will have no effect on the market price.
2. The products sold by all the firms in the industry are identical. The product sold by one firm can be substituted perfectly for the product sold by any other firm in the industry. Products are not differentiated by packaging, advertising, or quality.
3. Entry is easy, and there are many potential entrants. There are no huge economies of scale relative to the size of the market. Laws do not require producers to obtain licenses or pay for the privilege of producing. Other firms cannot take action to keep someone from entering the business. Firms can stop producing and can sell or liquidate the business without difficulty.
4. Buyers and sellers have perfect information. Buyers know the price and quantity at each firm. Each firm knows what the other firms are charging and how they are behaving.



### 1 What is perfect competition?

*Perfect competition is a firm behavior that occurs when many firms produce identical products and entry is easy.*

## 1.b. The Demand Curve of the Individual Firm

A firm in a perfectly competitive market structure is said to be a **price taker** because the price of the product is determined by market demand and supply, and the individual firm has to sell at that price or simply not sell. In 2005, the world market price of corn was about \$1 per bushel. By 2008 the world market price of corn had been driven up to about \$4 per bushel and by 2011 was nearly \$7 per bushel because of the use of corn in creating ethanol. Approximately 50 percent of all the corn harvested in the world comes from the United States. Nevertheless, the average farm in the United States produces an extremely small percentage of the total quantity harvested each year.

Just because the numbers are easy to deal with, let's consider the 2005 price of \$1 per bushel. What would occur if, in 2005, one U.S. farmer decided to set the price of corn at \$1.20 per bushel when the market price was \$1 per bushel? According to the model of a perfectly competitive market, no one would purchase the higher-priced corn because the identical product could be obtained without difficulty elsewhere for \$1 per bushel. In this instance, what the model predicts is what actually occurs in the real-world corn market. The grain silo owner who buys the farmers' grain would simply pass on that farm's grain and move to the next truckful of grain at \$1 per bushel. By setting a price above the market price, the individual farmer may sell nothing.

Is an individual farmer likely to set a price of \$.80 per bushel when the market price is \$1 per bushel? Not in a perfectly competitive market. All of the produce from a single

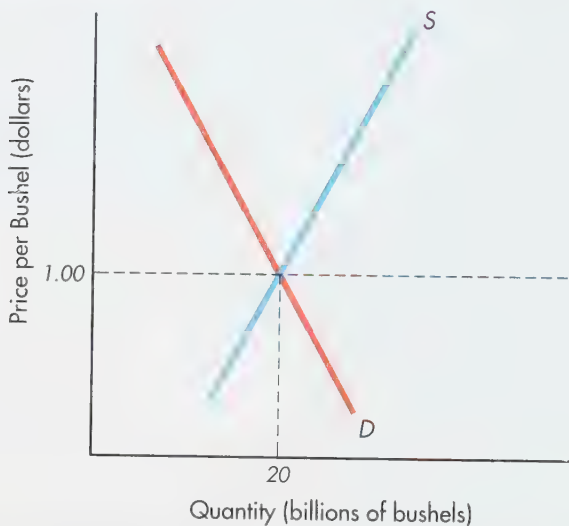
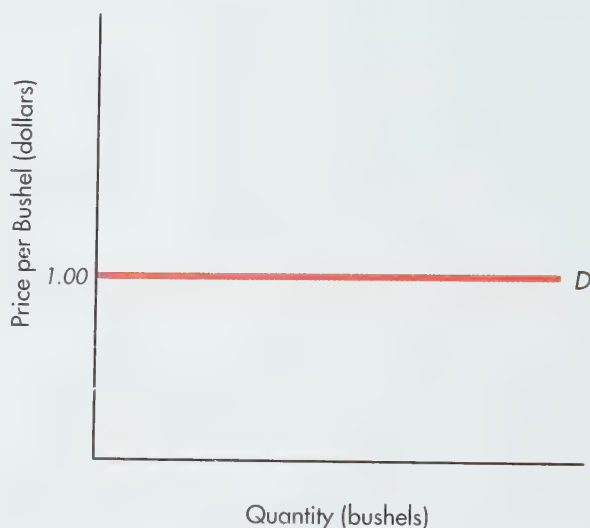


### 2 What does the demand curve facing the individual firm look like, and why?

#### price taker

A firm in a perfectly competitive market structure.

*The individual firm in a perfectly competitive industry is a price taker because it cannot charge more than the market price, and it will not charge less.*

**FIGURE 1** Market Demand and Supply and Single-Firm Demand for Corn**(a) Market****(b) Individual Firm**

Market demand and supply are shown in Figure 1(a). The equilibrium price is \$1 per bushel, and 20 billion bushels are produced and sold. The equilibrium price defines the horizontal or perfectly elastic demand curve faced by the individual perfectly competitive firm in Figure 1(b).

farm can be sold at the market price. Why would a farmer sell at \$.80 per bushel when he or she can get \$1 per bushel? The individual farm is a price taker because it cannot charge more than the market price, and it will not charge less.

You could think of price takers as being the sellers in a big auction. The potential buyers bid against each other for the product until a price is determined. The product is then sold at that price. The seller has no control over the price.

Market demand and supply in a perfectly competitive market are shown in Figure 1(a). The demand curve of a single firm is shown in Figure 1(b). The horizontal line at the market price is the demand curve faced by an individual firm in a perfectly competitive market structure. It shows that the individual firm is a price taker—that the demand curve is perfectly elastic. The question facing the individual firm in a perfectly competitive industry is how much to produce, not what price to charge.



**3** How does the firm maximize profit in the short run?

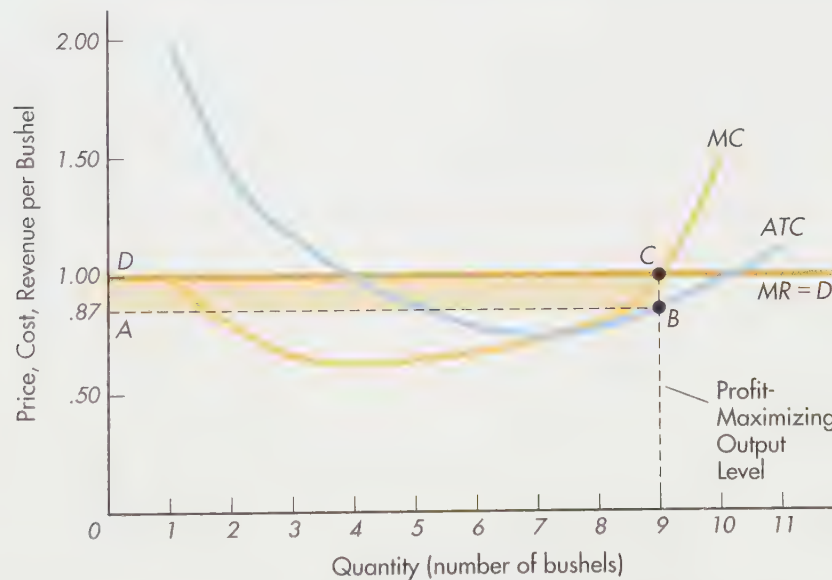
### 1.c. Profit Maximization

We know that profit is maximized at the quantity where  $MR = MC$ . Profit rises when the revenue brought in by the sale of one more unit (one more bushel) is greater than the cost of producing that unit. Conversely, if the cost of producing one more unit is greater than the amount of revenue brought in by selling that unit, profit declines with the production of that unit. Only when marginal revenue and marginal cost are the same is profit at a maximum, as illustrated in Figure 2.<sup>1</sup>

<sup>1</sup> Marginal revenue and marginal cost could be equal at small levels of production and sales, such as with the first bushel, but profit would definitely not be at its greatest level. The reason is that marginal cost is falling with the first unit of production—the marginal cost of the second unit is less than the marginal cost of the first unit. Since marginal revenue is the same for both the first and the second units, profit actually rises as quantity increases. Profit maximization requires both that marginal revenue equal marginal cost and that marginal cost be rising. Since marginal revenue and marginal cost are the same for the ninth bushel and marginal cost is rising, the ninth bushel is the profit-maximizing level of output.

**FIGURE 2** Profit Maximization

| Total Output (Q) | Price (P) | Total Revenue (TR) | Total Cost (TC) | Total Profit (TR - TC) | Marginal Revenue (MR) | Marginal Cost (MC) | Average Total Cost (ATC) |
|------------------|-----------|--------------------|-----------------|------------------------|-----------------------|--------------------|--------------------------|
| 0                | \$1       | \$ 0               | \$ 1.00         | -\$1.00                | \$1                   | —                  | —                        |
| 1                | \$1       | \$ 1               | \$ 2.00         | -\$1.00                | \$1                   | \$1.00             | \$2.00                   |
| 2                | \$1       | \$ 2               | \$ 2.80         | -\$ .80                | \$1                   | \$ .80             | \$1.40                   |
| 3                | \$1       | \$ 3               | \$ 3.50         | -\$ .50                | \$1                   | \$ .70             | \$1.1667                 |
| 4                | \$1       | \$ 4               | \$ 4.00         | \$ .00                 | \$1                   | \$ .50             | \$1.00                   |
| 5                | \$1       | \$ 5               | \$ 4.50         | \$ .50                 | \$1                   | \$ .50             | \$ .90                   |
| 6                | \$1       | \$ 6               | \$ 5.20         | \$ .80                 | \$1                   | \$ .70             | \$ .8667                 |
| 7                | \$1       | \$ 7               | \$ 6.00         | \$1.00                 | \$1                   | \$ .80             | \$ .8571                 |
| 8                | \$1       | \$ 8               | \$ 6.86         | \$1.14                 | \$1                   | \$ .86             | \$ .8575                 |
| 9                | \$1       | \$ 9               | \$ 7.86         | \$1.14                 | \$1                   | \$1.00             | \$ .8733                 |
| 10               | \$1       | \$10               | \$ 9.36         | \$ .64                 | \$1                   | \$1.50             | \$ .936                  |
| 11               | \$1       | \$11               | \$12.00         | -\$1.00                | \$1                   | \$2.64             | \$1.09                   |



The profit-maximization point for a single firm is shown for a price of \$1 per bushel. Marginal revenue and marginal cost are equal at the profit-maximization point, 9 bushels. At quantities less than 9 bushels, marginal revenue exceeds marginal cost, so increased production would raise profits. At quantities greater than 9, marginal revenue is less than marginal cost, so reduced production would increase profits. The point at which profit is maximized is shown by the highlighted row in the table. The profit per unit is the difference between the price line and the average-total-cost curve at the profit-maximizing quantity. Total profit (\$1.14) is the rectangle ABCD, an area that is equal to the profit per unit times the number of units.

With a price of \$1 per bushel, the individual farm maximizes profit by producing 9 bushels. We can illustrate how much profit the individual firm in perfect competition earns, or whether it makes a loss, by calculating total costs at the quantity where  $MR = MC$  and comparing that with total revenue.

Profit maximization occurs at the output level where  $MR = MC$ .





- 4 At what point does a firm decide to suspend operations?

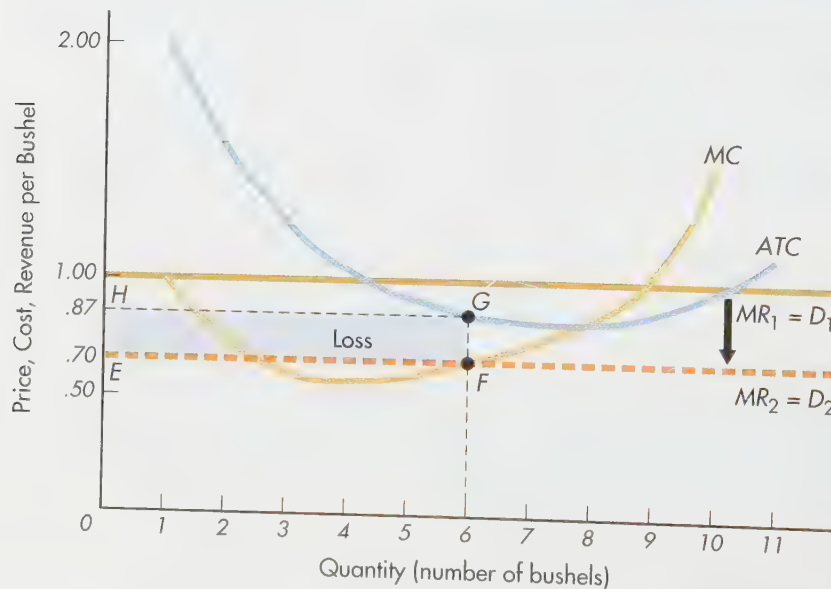
*MR = MC is the profit-maximizing or loss-minimizing output level.*

In Figure 2, the price per bushel of \$1 exceeds the cost per bushel (average total cost, \$.8733) by the distance  $BC$  (\$.1267) when 9 bushels are produced. This amount (\$.1267) is the profit per bushel. The total profit is the rectangle  $ABCD$  (highlighted in the table).

Figure 3 illustrates what happens to the individual firm in a perfectly competitive market as the market price changes. The only curve in Figure 3 that changes as a result of the price change is the perfectly elastic demand curve (which is also the price line and the

**FIGURE 3** Loss Minimization

| Total Output (Q) | Price (P) | Total Revenue (TR) | Total Cost (TC) | Total Profit (TR - TC) | Marginal Revenue (MR) | Marginal Cost (MC) | Average Total Cost (ATC) |
|------------------|-----------|--------------------|-----------------|------------------------|-----------------------|--------------------|--------------------------|
| 0                | \$.70     | \$ 0               | \$ 1.00         | -\$1.00                | —                     | —                  | —                        |
| 1                | \$.70     | \$.70              | \$ 2.00         | -\$1.30                | \$.70                 | \$1.00             | \$2.00                   |
| 2                | \$.70     | \$1.40             | \$ 2.80         | -\$1.40                | \$.70                 | \$.80              | \$1.40                   |
| 3                | \$.70     | \$2.10             | \$ 3.50         | -\$1.40                | \$.70                 | \$.70              | \$1.1667                 |
| 4                | \$.70     | \$2.80             | \$ 4.00         | -\$1.20                | \$.70                 | \$.50              | \$1.00                   |
| 5                | \$.70     | \$3.50             | \$ 4.50         | -\$1.00                | \$.70                 | \$.50              | \$.90                    |
| 6                | \$.70     | \$4.20             | \$ 5.20         | -\$1.00                | \$.70                 | \$.70              | \$.8667                  |
| 7                | \$.70     | \$4.90             | \$ 6.00         | -\$1.10                | \$.70                 | \$.80              | \$.8571                  |
| 8                | \$.70     | \$5.60             | \$ 6.86         | -\$1.26                | \$.70                 | \$.86              | \$.8575                  |
| 9                | \$.70     | \$6.30             | \$ 7.86         | -\$1.56                | \$.70                 | \$1.00             | \$.8733                  |
| 10               | \$.70     | \$7.00             | \$ 9.36         | -\$2.36                | \$.70                 | \$1.50             | \$.936                   |
| 11               | \$.70     | \$7.70             | \$12.00         | -\$4.30                | \$.70                 | \$2.64             | \$1.09                   |



In Figure 3 the price changed from \$1 per bushel to \$.70 per bushel. The profit-maximization, or loss-minimization, point is the level of output where  $MR = MC$ . If, at this output level, the price is less than the corresponding average-cost curve, the firm makes a loss. At a price of \$.70 per bushel, a loss is incurred—the loss-minimizing level of output is 6 bushels, as shown by the highlighted bar in the table. The total loss is the rectangle  $EFGH$ .

marginal-revenue curve). Let's assume that the market price changes to \$.70 per bushel, so that the individual farm's demand curve shifts down. Whether the firm is making a profit is determined by finding the new quantity at which the new marginal-revenue curve,  $MR_2$ , equals the marginal-cost curve, at point  $F$ , and then tracing a vertical line from point  $F$  to the  $ATC$  curve at point  $G$ . The distance  $FG$  is the profit or loss per unit of output. If the demand curve is above the  $ATC$  curve at that point, the firm is making a profit. If the  $ATC$  curve exceeds the price line, as is the case in Figure 3, the firm is suffering a loss.

A firm cannot make a profit as long as the price is less than the average-cost curve, because the cost per bushel ( $ATC$ ) exceeds the revenue per bushel (price). At a price of \$.70 per bushel, marginal revenue and marginal cost are equal as the sixth bushel is produced (see Figure 3 and the highlighted bar in the table), but the average total cost is greater than the price. The cost per bushel ( $ATC$ ) is \$.8667, which is higher than the price or revenue per bushel of \$.70. Thus, the firm makes a loss, shown as the rectangle  $EFGH$  in Figure 3.

Recall that an economic loss means that opportunity costs are not being covered by revenues; that is, the owners could do better in another line of business. An economic loss means that a firm is confronted with the choice of whether to continue producing, shut down temporarily, or shut down permanently. The decision depends on which alternative has the lowest opportunity cost.

### 1.d. Short-Run Break-Even and Shutdown Prices

In the short run, certain costs, such as rent on land and equipment, must be paid whether or not any output is produced. These are the firm's fixed costs. If a firm has purchased equipment and buildings but does not produce, the firm still has to pay for the equipment and buildings. Thus, the decision about whether to produce or to temporarily suspend operations depends on which option promises the lesser costs. In order to continue producing in the short run, the firm must earn sufficient revenue to pay all of the *variable* costs (the costs that change as output changes), because then the excess of revenue over variable costs will enable the firm to pay some of its fixed costs. If the firm cannot pay all the variable costs out of revenue, then it should suspend operations temporarily because if it continues to produce, it must pay not only its fixed costs but also those variable costs in excess of revenue.

Does suspending operations mean quitting the business altogether—shutting down permanently? It may, but it need not. The decision depends on the long-term outlook. If the long-term outlook indicates that revenue will exceed costs, then production is warranted. However, if the outlook is for continued low prices and inability to cover costs, a firm would be better off quitting the business altogether.

To see how producing at a loss can at times be better than not producing at all, let's return to the individual farm in Figure 4. At a price of \$.70 per bushel, the output at which  $MR = MC$  is 6 bushels, as shown by the highlighted bar in the table.

At 6 bushels, total revenue is \$4.20 and total cost is \$5.20. The farm loses \$1 by producing 6 bushels. The question is whether to produce at all. If production is stopped, the fixed cost of \$1 must still be paid. Thus, the farmer is indifferent between producing 6 bushels and losing \$1 or shutting down and losing \$1. Should the price be less than the minimum point of the average-variable-cost curve ( $AVC$ ), as would occur at any price less than  $P = .70$  per bushel, the farm is not earning enough to cover its variable costs (see Figure 4 and the accompanying table). By continuing to produce, the farm will lose more than it would lose if it suspended operations or shut down until the outlook improved. The minimum point of the average-variable-cost curve is the **shutdown price**. If the market price is less than the minimum point of the  $AVC$  curve, then the firm will incur fewer losses if it does not produce than if it continues to produce in the short run.



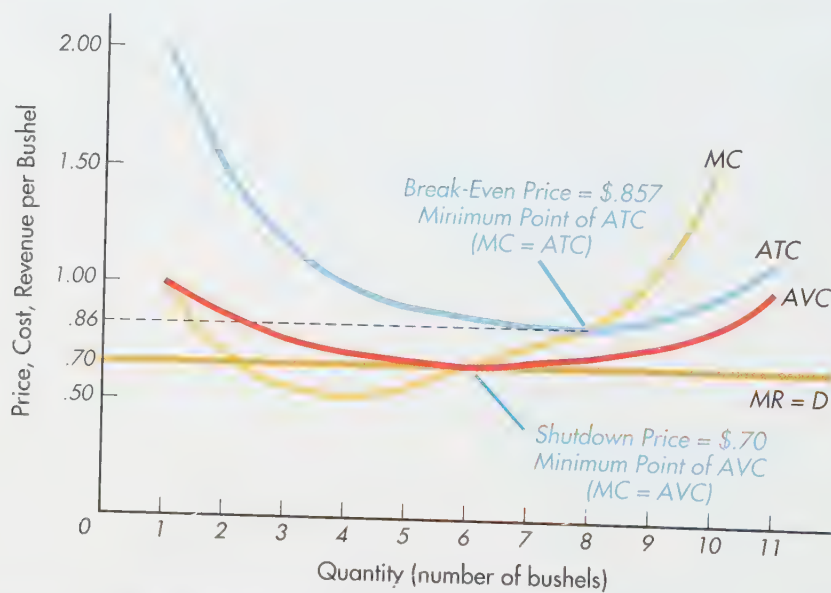
**5** When will a firm shut down permanently?

#### **shutdown price**

The minimum point of the average-variable-cost curve.

FIGURE 4 Shutdown Price

| Total Output (Q) | Price (P) | Total Revenue (TR) | Total Cost (TC) | Total Profit (TR - TC) | Marginal Revenue (MR) | Marginal Cost (MC) | Average Total Cost (ATC) | Average Variable Cost (AVC) |
|------------------|-----------|--------------------|-----------------|------------------------|-----------------------|--------------------|--------------------------|-----------------------------|
| 0                | \$.70     | \$ 0               | \$ 1.00         | -\$1.00                | —                     | —                  | —                        | —                           |
| 1                | \$.70     | \$ .70             | \$ 2.00         | -\$1.30                | \$.70                 | \$1.00             | \$2.00                   | \$1.00                      |
| 2                | \$.70     | \$1.40             | \$ 2.80         | -\$1.40                | \$.70                 | \$.80              | \$1.40                   | \$.90                       |
| 3                | \$.70     | \$2.10             | \$ 3.50         | -\$1.40                | \$.70                 | \$.70              | \$1.1667                 | \$.833                      |
| 4                | \$.70     | \$2.80             | \$ 4.00         | -\$1.20                | \$.70                 | \$.50              | \$1.00                   | \$.75                       |
| 5                | \$.70     | \$3.50             | \$ 4.50         | -\$1.00                | \$.70                 | \$.50              | \$.90                    | \$.70                       |
| 6                | \$.70     | \$4.20             | \$ 5.20         | -\$1.00                | \$.70                 | \$.70              | \$.8667                  | \$.70                       |
| 7                | \$.70     | \$4.90             | \$ 6.00         | -\$1.10                | \$.70                 | \$.80              | \$.8571                  | \$.714                      |
| 8                | \$.70     | \$5.60             | \$ 6.86         | -\$1.26                | \$.70                 | \$.86              | \$.8575                  | \$.7325                     |
| 9                | \$.70     | \$6.30             | \$ 7.86         | -\$1.56                | \$.70                 | \$1.00             | \$.8733                  | \$.7622                     |
| 10               | \$.70     | \$7.00             | \$ 9.36         | -\$2.36                | \$.70                 | \$1.50             | \$.936                   | \$.836                      |
| 11               | \$.70     | \$7.70             | \$12.00         | -\$4.30                | \$.70                 | \$2.64             | \$1.09                   | \$1.00                      |



When the firm is making a loss, it must decide whether to continue producing or to suspend operations and not produce. The decision depends on which alternative has higher costs. When the price is equal to or greater than the minimum point of the average-variable-cost curve, the firm is earning sufficient revenue to pay for all of its variable costs. When the price is less than the minimum point of the average-variable-cost curve, the firm is not covering all of its variable costs. In that case the firm is better off shutting down its operations. For this reason, the minimum point of the AVC curve is called the *shutdown price*. The *break-even price* is the minimum point of the ATC curve because at that point all costs are being paid.

At prices above the minimum point of the average-variable-cost curve, the excess of revenue over variable costs means that some fixed costs can be paid. A firm is better off producing than shutting down because, by producing, it is able to earn enough revenue to pay all the variable costs and some of the fixed costs. If the firm does not produce, it



will still have to pay all of the fixed costs. When the price equals the minimum point of the average-total-cost curve, the firm is earning just enough revenue to pay for all of its costs, fixed and variable. This point is called the **break-even price**. At the break-even price, economic profit is zero—all costs are being covered, including opportunity costs. Because costs include the opportunity costs of the resources already owned by the entrepreneur—his or her own labor and capital—zero economic profit means that the entrepreneur could not do better in another activity. Zero economic profit is normal profit, profit that is just sufficient to keep the entrepreneur in this line of business.

The shutdown price is the price that is equal to the minimum point of the *AVC* curve. The break-even price is the price that is equal to the minimum point of the *ATC* curve. In the examples just discussed, the firm continues to operate at a loss because variable costs are being covered and the long-term outlook is favorable. Many firms decide to operate for a while at a loss, then suspend operations temporarily, and finally shut down permanently. A firm will shut down permanently if it cannot pay all its costs in the long run. In the long run, the minimum point of the *ATC* curve is the permanent shutdown point. Price must exceed the minimum point of the *ATC* curve in the long run if the firm is to remain in business. Of the 80,000 businesses that shut down permanently in 1997, most went through a period in which they continued to operate even though revenue was not large enough to pay variable costs.

### break-even price

A price that is equal to the minimum point of the average-total-cost curve.



**6** What is the break-even price?

## 1.e. The Firm's Supply Curve in the Short Run

As long as revenue equals or exceeds variable costs, an individual firm will produce the quantity at which marginal revenue and marginal cost are equal. This means that the individual firm's supply curve is the portion of the *MC* curve that lies above the *AVC* curve. An individual firm's supply curve shows the quantity that a firm will produce and offer for sale at each price. When the price is less than the minimum point of the *AVC* curve, a firm incurs fewer losses from not producing than from producing. The firm thus produces and supplies nothing, and there is no supply curve. When the price is greater than the minimum point of the *AVC* curve, the firm will produce and offer for sale the quantity yielded at the point where the *MC* curve and the *MR* line intersect for each price. The supply curve is thus the *MC* curve. The portion of the *MC* curve lying above the minimum point of the *AVC* curve is the individual firm's supply curve in the short run.

In our example of an individual farm illustrated in Figure 4, nothing is produced at a price of \$.50 per bushel. At \$.70 per bushel, the farm produces 6 bushels in the short run; at \$1 per bushel, the farm produces 9 bushels. The higher the price, the greater the quantity produced and offered for sale.

A firm may continue to produce and offer its products for sale even if it is earning a negative economic profit, as long as it earns enough revenue to pay its variable costs and expects revenue to grow enough to pay all costs eventually. If the business does not improve and losses continue to pile up, the firm will shut down permanently. In the long run, the firm must be able to earn enough revenue to pay all of its costs. If it does not, the business will not continue to operate. If the firm does earn enough to pay its costs, the firm will produce and offer for sale the quantity of output yielded at the point where  $MR = MC$ . This means that the firm's long-run supply curve is the portion of its *MC* curve that lies above the minimum point of the *ATC* curve.



**7** What is the firm's supply curve in the short run?

## RECAP

1. The firm maximizes profit or minimizes losses by producing at the output level at which *MR* and *MC* are equal.
2. In order to remain in business, the firm must earn sufficient revenue to pay for all of its variable costs. The shutdown price is the price that is just equal to the minimum point of the *AVC* curve.

3. The firm's break-even price is the price that is just equal to the minimum point of the ATC curve.
4. The portion of the marginal-cost curve lying above the minimum point of the AVC curve is the firm's short-run supply curve.
5. The portion of the marginal-cost curve lying above the minimum point of the ATC curve is the firm's long-run supply curve.



- 8** What is the firm's supply curve in the long run?

*Exit and entry are long-run phenomena.*

## 2. The Long Run

In the short run, at least one of the resources *cannot* be altered. This means that new firms cannot be organized and begin producing. Thus the supply of firms in an industry is fixed in the short run. In the long run, of course, all quantities of resources can be changed. Buildings can be built or purchased and machinery accumulated and placed into production. New firms may arise as entrepreneurs who are not currently in the industry see that they could earn more than they are currently earning and decide to expand into new businesses.

Entry and exit can both occur in the long run. On average, 4.5 percent of the total number of farms in the United States go out of business each year, and more than half of them file for bankruptcy.

How does exit occur? Entrepreneurs may sell their businesses and move to another industry, or they may use the bankruptcy laws to exit the industry. In the United States, a sole proprietor or partnership may file Chapter 13 personal bankruptcy; a corporation may file Chapter 7 bankruptcy or a Chapter 11 reorganization; a farmer may file Chapter 12. The chapters refer to specific sections of the Bankruptcy Law. From the mid-1970s to the present, the average birthrate for all industries (the percent of total businesses that begin during a year) has been just over 11.2 percent, and the average death rate (the percent of total businesses that disappear during a year) has been 9.6 percent.

Bankruptcy laws in the developed nations are similar to those in the United States. Although most nations have some laws regarding going out of business, the laws are not enforced or used in many emerging-market nations. In most less-developed countries, a farmer goes out of business by simply walking away. The farmer does not hold title to the land in the first place, and so when the land no longer provides support for the family, it is left untilled and uncared for.

### 2.a. The Market Supply Curve and Exit and Entry

Recall from Chapter 3 that the market supply curve shifts when the number of suppliers changes. The market supply curve is the sum of all the individual firms' supply curves. In the corn-producing business, when new farms enter the market, the total quantity of corn supplied at each price increases. In other words, entry causes the market supply curve to shift out to the right.

Conversely, exit means that there are fewer producers and lower quantities supplied at each price, and there is a leftward or inward shift of the market supply curve. Suppose some existing firms are not covering their costs and believe that the future is not bright enough to warrant continued production. As a result, they shut down their operations and sell their equipment and land. As the number of farms in the industry declines, everything else held constant, the market supply curve shifts to the left—as long as those remaining in the business produce the same quantity as they did before the farms exited, or less.

*When additional firms enter the industry and begin producing the product, the market supply curve shifts out.*

*When firms leave the industry, the market supply curve shifts in.*



## 2.b. Normal Profit in the Long Run

One of the principal characteristics of the perfectly competitive market structure is that entry and exit can occur easily. Entry and exit occur whenever firms are earning more or less than a *normal profit* (zero economic profit). When a normal profit is being earned, there is no entry or exit. This condition is the long-run equilibrium.

The process of establishing the long-run position is shown in Figure 5. The market demand and supply curves for corn are shown in Figure 5(a), and the cost and revenue curves for a representative firm in the industry are shown in Figure 5(b). Let's assume that the market price is \$1. Let's also assume that at \$1 per bushel, the demand curve facing the individual farm (the price line) is equal to the minimum point of the *ATC* curve. The quantity produced is 9 bushels. The individual farm and the industry are in equilibrium. There is no reason for entry or exit to occur, and there is no reason for individual farms to change their scale of operation.

To illustrate how the process of reaching the long-run equilibrium occurs in the perfectly competitive market structure, let's begin with the corn market in equilibrium at  $S_1 = D_1$ . Now, the United States starts using corn in the production of ethanol. As a result of the increased demand, as shown by the rightward shift of the demand curve to  $D_2$  in Figure 5(a), the market price is driven up to \$2.50 per bushel, where the new market demand curve intersects the initial market supply curve,  $S_1$ . This raises the demand curve for the individual farm to the horizontal line at \$2.50 per bushel. In the short run, the individual farms in the industry increase production (by adding variable inputs) from 9 bushels to 10 bushels, the point in Figure 5(b) where  $MC = MR_2 = \$2.50$ , and earn economic profit of the amount shown by the yellow rectangle.

The above-normal profit attracts others to the farming business. The result of the new entry and expansion is a rightward shift of the market supply curve. How far does the market supply curve shift? It shifts until the market price is low enough that firms in the industry earn normal profit.

As the demand for corn continues to rise, the price continues to rise, and in the long run new acres are used to produce more corn. The process ends when firms are all earning just a normal profit. As a very simple example, let us suppose that the costs of doing business do not rise as the market expands. Then, if the market supply curve shifts to  $S_2$ , the new market price, \$2.50, is less than the former price of \$4 but still high enough for firms to earn above-normal profits. These profits are sufficient inducement for more firms to enter, causing the supply curve to shift farther right. The supply curve continues to shift until there is no incentive for additional firms to enter—that is, until firms are earning the normal profit, where price is equal to the minimum *ATC*, shown as  $S_3$  in Figure 5(a). When the adjustment stops, firms are just earning the normal profit.



The price taker can do nothing but accept and sell at the market price. When times are bad, the market price may be so low that some firms must exit the market. In this photo, a firm is going out of business, liquidating all its assets, and eventually shutting its doors.

*In the long run, perfectly competitive firms earn normal profits.*

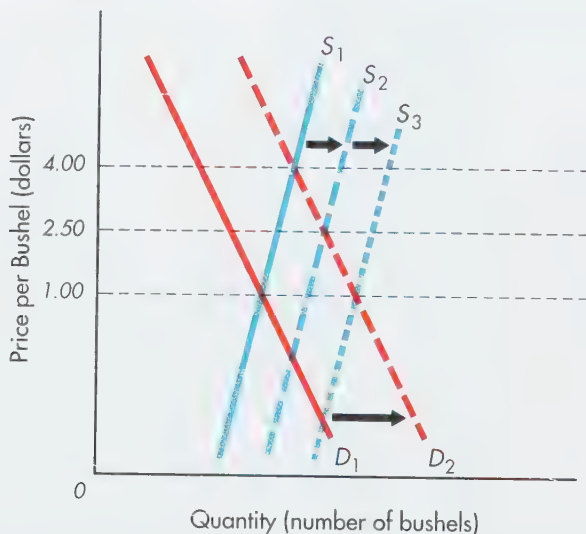
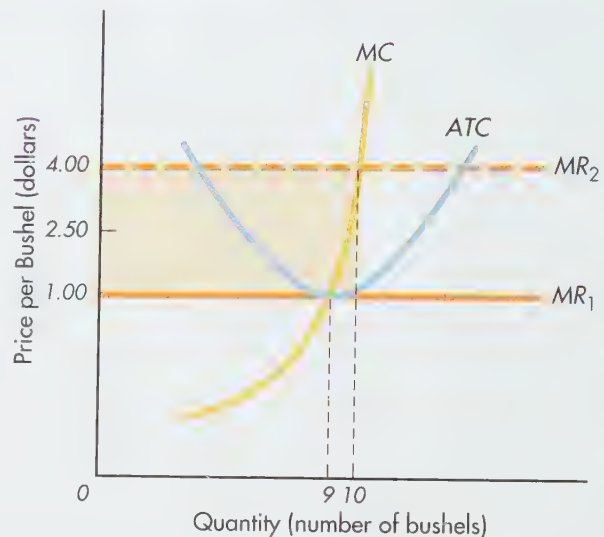
## 2.c. The Predictions of the Model of Perfect Competition

According to the model of perfect competition, whenever *above-normal* profits (positive economic profits) are earned by existing firms, entry occurs until a *normal* profit (zero economic profit) is earned by all firms. Conversely, whenever economic losses occur, exit takes place until a normal profit is made by all remaining firms.



- 9 What are the long-run equilibrium results of a perfectly competitive market?



**FIGURE 5** Economic Profit in the Long Run**(a) Market****(b) Individual Firm**

Market demand and supply determine the price and the demand curve faced by the single perfectly competitive firm. At a price of \$1 per bushel, the individual farm is earning normal profit. The demand for corn to use in ethanol production drives the price of corn up to \$4 per bushel. At \$4 per bushel, the single farm makes a profit equal to the yellow rectangle. Above-normal profits induce new farms to begin raising corn and existing farms to increase their production.

*Perfect competition results in economic efficiency.*

### economic efficiency

The situation in which the price of a good or service just covers the marginal cost of producing that good or service and people are getting the goods and services that they want.

It is so important to keep in mind the distinctions between economic and accounting terms that we repeatedly remind you of them. A *zero economic profit* is a *normal accounting profit*, or just *normal profit*. It is the profit that is just sufficient to keep a business owner or investors in a particular line of business, the point where revenue exactly equals total opportunity costs. Business owners and investors earning a normal profit are earning enough to cover their opportunity costs—they could not do better by changing—but they are not earning more than their opportunity costs. An *economic loss* refers to a situation in which revenue is not sufficient to pay all of the opportunity costs. A firm can earn a positive accounting profit and yet be experiencing a loss, not earning a normal profit.

The long-run equilibrium position of the perfectly competitive market structure shows firms producing at the minimum point of their long-run average-total-cost curves. If the price is above the minimum point of the *ATC* curve, then firms are earning above-normal profits, and entry will occur. If the price is less than the minimum of the *ATC* curve, exit will occur. Only when price equals the minimum point of the *ATC* curve will neither entry nor exit take place.

Producing at the minimum of the *ATC* curve means that firms are producing with the lowest possible costs. Changing the way they produce won't allow them to produce less expensively. Altering the resources they use won't allow them to produce less expensively.

Firms produce at a level where marginal cost and marginal revenue are the same. Since marginal revenue and price are the same in a perfectly competitive market, firms produce where marginal cost equals price. This means that firms are employing resources until the marginal cost to them of producing the last unit of a good just equals the price of the last unit. Moreover, since price is equal to marginal cost, consumers are paying a price that is as low as it can get; the price just covers the marginal cost of producing that good or service. There is no waste—no one could be made better off without making someone else worse off. Economists refer to this result as **economic efficiency**.

**2.c.1. Consumer and Producer Surplus** *Efficiency* is the term economists give to the situation in which firms are producing with as little cost as they can (at the minimum point of the *ATC* curve) and consumers are getting the products they desire at a price that is equal to the marginal cost of producing those goods. To say that a competitive market is efficient is to say that all market participants get the greatest benefits possible from market exchange.<sup>2</sup>

We measure the benefits from market exchange (the gains from trade) as the sum of the consumer surplus and the producer surplus. Consumer surplus is the difference between what consumers would be willing and able to pay for a product and the price they actually have to pay to buy the product. **Producer surplus** is the difference between the price that firms would have been willing and able to accept for their products and the price they actually receive.

Since the firm is willing to sell the product at the marginal cost, as long as marginal cost is greater than average variable cost, and since the firm receives the market price, the difference between the two is a bonus to the firm, a bonus resulting from market exchange. This bonus is producer surplus.

Consumer surplus = area above equilibrium price and below the demand curve

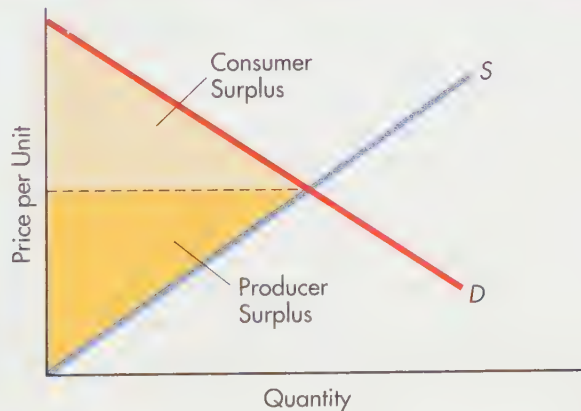
Producer surplus = area below equilibrium price and above the supply curve

Figure 6 illustrates consumer and producer surplus in a competitive market. The sum of producer and consumer surplus represents the total benefits that come from

#### producer surplus

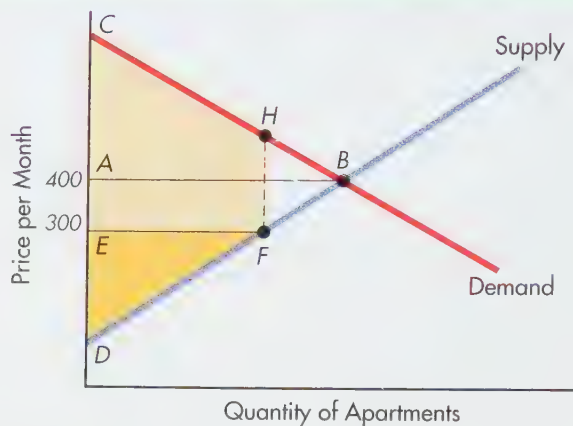
The difference between the price firms would have been willing to accept for their products and the price they actually receive.

**FIGURE 6** Producer and Consumer Surpluses



Since the firm is willing to sell the product at the marginal cost and since the firm receives the market price, the difference between the two is a bonus to the firm, a bonus of market exchange. This bonus is producer surplus. The total producer surplus in a competitive market is the sum of the producer surplus received by each firm in the market. Producer surplus is the area below the price line and above the supply curve. Also pictured is total consumer surplus. Recall that consumer surplus is the difference between what the consumer would be willing to pay for a good (the demand curve) and the price actually paid. The sum of producer and consumer surplus represents the total benefits that come from exchange in the market: benefits that accrue to the consumer plus those that accrue to the firm.

<sup>2</sup> Economists have classified efficiency into several categories. *Productive efficiency* refers to the firm's use of the least-cost combination of resources to produce any output level. This output level may not be the goods that consumers want, however. *Allocative efficiency* is the term given to the situation in which firms are producing the goods that consumers most want, and consumers are paying a price that is just equal to the marginal cost of producing those goods. Allocative efficiency may occur when firms are not producing at their most efficient level. Economic efficiency exists when both productive and allocative efficiency occur.

**FIGURE 7** Rent Control and Market Efficiency

The market for rental apartments is pictured in this graph; the market solution would yield a monthly rent of \$400. The consumer surplus would be the area  $ABC$ ; the producer surplus would be the area  $ABD$ . Now, suppose the city imposes rent control at \$300 per month. The producer surplus changes to area  $EFD$  while the consumer surplus changes to  $EFHC$ . The total surplus has been reduced by the rent control.

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exchange in a market (the gains from trade): the benefits that accrue to the consumer plus those that accrue to the firm.

The primary result of perfect competition is that things just do not get any better<sup>3</sup>: Total consumer and producer surplus is at a maximum. Any interference with the market exchange reduces the total surplus. Consider rent control on apartments, for instance. The market for rental apartments is pictured in Figure 7. As shown in Figure 7, the market solution would yield a monthly rent of \$400. The consumer surplus would be the area  $ABC$ ; the producer surplus would be the area  $ABD$ . Now, suppose the city imposes a rent control at \$300 per month. The producer surplus changes to area  $EFD$ , while the consumer surplus changes to  $EFHC$ . Clearly the total surplus has been reduced. The question that policymakers must decide is whether the additional benefits to consumers offset the additional losses to producers. We will discuss this further in the chapter “Government and Market Failure.”

## RECAP

1. Entry occurs when firms are earning above-normal profit or positive economic profit.
2. A temporary shutdown occurs when firms are not covering their variable costs in the short run. In the long run, exit occurs when firms are not covering all costs.
3. The short-run market supply curve is the horizontal sum of the supply curves of all individual firms in the industry.
4. In a perfectly competitive market, firms produce goods at the least cost, and consumers purchase the goods that they most desire at a price that is equal

to the marginal cost of producing those goods. There is no waste—no one could be made better off without making someone else worse off. Economists refer to this result as economic efficiency.

5. Producer surplus is the benefit that the firm receives for engaging in market exchange; it is the difference between the price the firm would be willing to sell its goods for and the price the firm actually receives.
6. Consumer surplus is the area below the demand curve and above the equilibrium price; producer surplus is the area above the supply curve and below the equilibrium price.

<sup>3</sup> As long as everyone wants the identically same generic products.



## SUMMARY

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### 1. What is perfect competition?

- Perfect competition is a market structure in which there are many firms that are producing an identical product and where entry and exit are easy. §1.a

### 2. What does the demand curve facing the individual firm look like, and why?

- The demand curve of the individual firm is a horizontal line at the market price. Each firm is a price taker. §1.b

### 3. How does the firm maximize profit in the short run?

- The individual firm maximizes profit by producing at the point where  $MR = MC$ . §1.c

### 4. At what point does a firm decide to suspend operations?

- A firm will shut down operations temporarily if price does not exceed the minimum point of the average-variable-cost curve. §1.c

### 5. When will a firm shut down permanently?

- A firm will shut down operations permanently if price does not exceed the minimum point of the average-total-cost curve in the long run. §1.d

### 6. What is the break-even price?

- The firm breaks even when revenue and cost are equal—when the demand curve (price) just equals the minimum point of the average-total-cost curve. §1.d

### 7. What is the firm's supply curve in the short run?

- The firm's short-run supply curve is the portion of its marginal-cost curve that lies above the minimum point of the average-variable-cost curve. §1.e

### 8. What is the firm's supply curve in the long run?

- The firm produces at the point where marginal cost equals marginal revenue, as long as marginal revenue exceeds the minimum point of the average-total-cost curve. Thus, the firm's long-run supply curve is the portion of its marginal-cost curve that lies above the minimum point of the average-total-cost curve. §1.e

### 9. What are the long-run equilibrium results of a perfectly competitive market?

- In the long run, all firms operating in perfect competition will earn a normal profit by producing at the lowest possible cost, and all consumers will buy the goods and services that they most want at a price equal to the marginal cost of producing those goods and services. §2.c
- Producer surplus is the difference between what a firm would be willing to produce and sell a good for and the price that the firm actually receives for the good. Consumer surplus is the difference between what an individual would be willing to pay for a good and what the individual actually has to pay. Total consumer and producer surpluses (the gains from trade) are at a maximum in a perfectly competitive market. §2.c.1

## KEY TERMS

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break-even price, 189  
economic efficiency, 192

price taker, 183  
producer surplus, 193

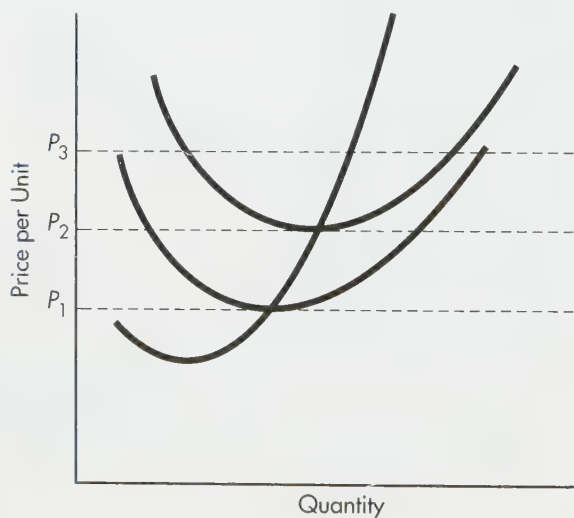
shutdown price, 187

## EXERCISES

1. Cost figures for a hypothetical firm are given in the following table. Use them for the exercises below. The firm is selling in a perfectly competitive market.

| Output | Fixed Cost | AFC | Variable Cost | AVC | Total Cost | ATC | MC |
|--------|------------|-----|---------------|-----|------------|-----|----|
| 1      | \$50       |     | \$ 30         |     |            |     |    |
| 2      | \$50       |     | \$ 50         |     |            |     |    |
| 3      | \$50       |     | \$ 80         |     |            |     |    |
| 4      | \$50       |     | \$120         |     |            |     |    |
| 5      | \$50       |     | \$170         |     |            |     |    |

- Fill in the blank columns.
  - What is the minimum price needed by the firm to break even?
  - What is the shutdown price?
  - At a price of \$40, what output level would the firm produce? What would its profits be?
2. Label the curves in the following graph.



- At each market price,  $P_1$ ,  $P_2$ , and  $P_3$ , at what output level would the firm produce?
  - What profit would be earned if the market price was  $P_1$ ?
  - What are the shutdown and break-even prices?
3. Why might a firm continue to produce in the short run even though the market price is less than its average total cost?
4. Explain why the demand curve facing the individual firm in a perfectly competitive industry is a horizontal line.

- Explain what occurs in the long run in a constant-cost industry, an increasing-cost industry, and a decreasing-cost industry when the market demand declines (shifts in).
- What can you expect from an industry in perfect competition in the long run? What will the price be? What quantity will be produced? What will be the relation between marginal cost, average cost, and price?
- Assume that the market for illegal drugs is an example of a perfectly competitive market structure. Describe what the perfectly competitive market model predicts for illegal drugs in the long run. What is likely to be the impact of the U.S. government's war on drugs in the short run? In the long run?
- If no real-life industry meets the conditions of the perfectly competitive model exactly, why do we study perfect competition? What is the relevance of the model to a decision to switch careers? How might it shed some light on pollution, acid rain, and other social problems?
- Using the model of perfect competition, explain what it means to say, "Too much electricity is generated," or "Too little education is produced." Would the firm be producing at the bottom of the ATC curve if too much or too little was being produced?
- Private swimming pools can be dangerous. There are serious accidents each year in those areas of the United States where backyard pools are common. Should pools be banned? In other words, should the market for swimming pools be eliminated? Answer this in terms of producer and consumer surplus.
- Discuss whether the following are examples of perfectly competitive industries.
  - The U.S. stock market
  - The automobile industry
  - The consumer electronics market
  - The market for college students
- Macy's was making millions of dollars in profits when it declared bankruptcy. Explain Macy's decision.
- Entry and exit of firms occur in the long run, but not in the short run. Why? What is meant by the long run and the short run? Would you say that entry is more or less difficult than exit?

14. Use the following data for the exercises below.

| Price | Quantity Supplied | Quantity Demanded |
|-------|-------------------|-------------------|
| \$20  | 30                | 0                 |
| \$18  | 25                | 5                 |
| \$16  | 20                | 10                |
| \$14  | 15                | 15                |
| \$12  | 10                | 20                |
| \$10  | 5                 | 25                |
| \$ 8  | 0                 | 30                |

- What is the equilibrium price and quantity?
  - Draw the demand and supply curves. If this represents perfect competition, are the curves individual-firm or market curves? How is the quantity supplied derived?
  - Show the consumer surplus. Show the producer surplus.
  - Suppose that a price ceiling of \$12 was imposed. How would this change the consumer and producer surplus? Suppose a price floor of \$16 was imposed. How would this change the consumer and producer surplus?
- Use the model of perfect competition to explain the rise in corn prices from \$1 per bushel in 2004 to \$6 per bushel in 2011.
  - Draw a demand and supply diagram and illustrate what gains from trade are.
  - In exercise 16, explain why this illustrates gains from trade and what the gains mean for consumers and for producers.

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



# THE YEAR IN REVIEW AND THE YEARS AHEAD: DEVELOPMENTS IN HOUSING MARKETS

**T**he CoreLogic home price index, a comprehensive and closely watched measure of existing home prices, dropped 32 percent from the peak of the housing market in April 2006 to the trough in March 2009, following the bursting of the housing bubble that built up between 2002 and 2005. The United States had never before suffered such a sharp drop in national house prices. Although house prices fell about 30 percent in nominal terms during the Great Depression, general price levels at that time fell 25

percent. As a result, the real house price decline during the Great Depression was only about 7 percent. During the current episode, the overall inflation rate has slowed but not turned negative, making the recent decline in house prices far larger in real terms than that during the Depression.

House prices have generally stabilized since March 2009, fluctuating around a roughly flat trend line. Nonetheless, house prices have been volatile over the past year, because of unusual market conditions such as the large supply of distressed homes on the market

and the short-term impetus to demand from temporary tax credits for homebuyers. Among the factors that continue to keep sales and starts below their long-run trend levels are modest income growth, slower household formation, and tighter mortgage underwriting standards, as well as heightened uncertainty among potential homebuyers and the large “shadow inventory” of foreclosed and other distressed properties on (or soon to be on) the market.

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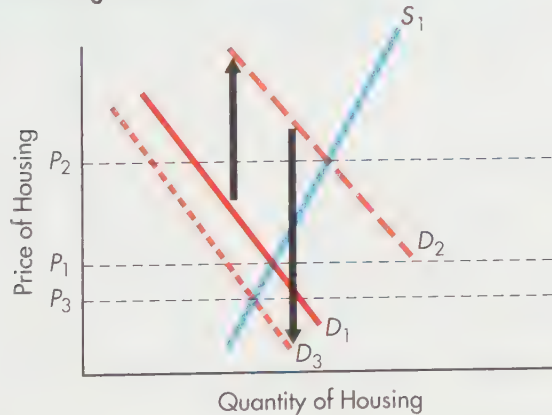
**Source:** Economic Report of the President, 2011.

Let's illustrate what went on in the housing market during 2002 and 2011, assuming the market can be depicted as perfectly competitive. The demand for houses comes from the need to have a roof over one's head. In addition, some buy a home because they think of it as an investment—its value will increase over time. The number of home buyers depends on how many are willing and able to pay the price for a home. Beginning in the early 2000s, the number of buyers rose because the government made it a requirement that lenders relax their standards and loan to those without perfect credit or lots of assets. As the profits of lenders rose, standards continued to decline and the number of homebuyers continued to rise. Beginning about 2004, the demand for housing began to rise at an accelerating rate. As demand rose, seen as the shift upward of demand to  $D_2$  from  $D_1$  on the left side of the figure below, the price of houses rose, illustrated by the increase from  $P_1$  to  $P_2$ . As people experienced the increased value of

their house, they began purchasing more homes, some selling their current home and buying a more expensive one and others buying multiple homes, demand continued shifting up and price continued rising. A bubble was occurring in house prices that popped in 2008. Demand dropped considerably, from  $D_2$  to  $D_3$ , which caused the price of houses to decline a great deal, to  $P_3$ . What was happening to an individual house developer or seller? On the right side of the figure is an illustration of what occurred to the individual house developer. Initially, at the point of zero economic profit,  $P_1$ , the per-unit cost of constructing a house,  $ATC$ , is equal to the demand for the house, so that zero economic profit is earned. When demand rose, so did the profit of individual seller. Notice the distance from  $A$  to  $B$ , the difference between the  $ATC$  and price. That is the individual developer's profit. To reap even more profits, the sellers began to construct more houses. But, the bubble popped, driving price down to  $P_3$ , where sellers were losing money (price is below  $ATC$ ).

**FIGURE A1** Market for Houses and Individual Housing Developer

## Housing Market



## Single Seller



LOW/GETTY IMAGES INC



## FUNDAMENTAL QUESTIONS

- 1 What is monopoly?
- 2 How is a monopoly created?
- 3 What does the demand curve for a monopoly firm look like, and why?
- 4 Why would someone want to have a monopoly in some business or activity?
- 5 Under what conditions will a monopolist charge different customers different prices for the same product?
- 6 How do the predictions of the models of perfect competition and monopoly differ?

**P**erfect competition captures the behavior of individual firms when there are a great many firms selling an identical product. To find out how a firm's behavior would be different in the opposite situation—that is, when there are no competitors, just one firm selling an item—economists use the model of monopoly. The market structure of monopoly is a model that is intended to be used as a contrast to perfect competition. The comparison enables us to understand the effects of competition and entry into markets.



# 1. The Market Structure of Monopoly

Does a monopolist earn unseemly profits by charging outrageously high prices? Does a monopolist go its own way no matter what customers want? What is the relation between the Parker Brothers game Monopoly and the economic model of monopoly? We'll discuss these questions in this chapter, and we'll begin by defining what a monopolist is.

## 1.a. Market Definition

**Monopoly** is a market structure in which there is a single supplier of a product. A **monopoly firm (monopolist)** may be large or small, but whatever its size, it must be the *only supplier* of the product. In addition, a monopoly firm must sell a product for which there are *no close substitutes*. This means the demand curve for a monopolist's good or service is very inelastic; it need not be perfectly inelastic since consumers may decide to do without the item rather than pay a higher price.

You purchase products from monopoly firms every day, perhaps without realizing it. Congress created the U.S. Postal Service to provide first-class mail service. No other firm is allowed to provide that service. In the United States, the currency you use is issued and its quantity is controlled by the Federal Reserve; in other countries, there is a central bank like the Federal Reserve that controls the money supply. It is illegal for any organization or individual other than the central bank to issue currency.



### 1 What is monopoly?

#### monopoly

A market structure in which there is a single supplier of a product.

#### monopoly firm (monopolist)

A single supplier of a product for which there are no close substitutes.

## 1.b. The Creation of Monopolies

The pharmaceutical firm GlaxoSmithKline's (formerly GlaxoWellcome) profits doubled in the three years following the introduction of AZT. GlaxoSmithKline was a monopoly supplier of AZT, a drug to slow down AIDS, and it was earning above-normal profits. But if a product is valuable and the owners are getting rich from selling it, won't others develop substitutes and also enjoy the fruits of the market? Yes, unless something gets in the way. The name given to that something is a **barrier to entry**. There are three general classes of barriers to entry:

- Natural barriers, such as economies of scale
- Actions on the part of firms that create barriers to entry
- Governmentally created barriers

**1.b.1. Economies of Scale** Economies of scale can be a barrier to entry. For instance, if there are economies of scale in the generation of electricity, then the larger the generating plant, the lower the cost per kilowatt-hour of electricity produced. A large generating plant could produce each unit of electricity much less expensively than several small generating plants. In this case, size would constitute a barrier to entry, since to be able to enter the market and compete with existing large-scale public utilities, a firm would have to be large enough that it could produce each kilowatt-hour as inexpensively as the large-scale plants.

**1.b.2. Actions by Firms** Entry is barred when one firm owns an essential resource. The owners of the desiccant clay mine in New Mexico had a monopoly position because they owned the essential resource, clay. No one could produce a close substitute for many years; eventually, a synthetic clay was developed. But until that time, the mine owners had a monopoly. Inventions and discoveries are essential resources, at least until others develop close substitutes. Microsoft owned the important resource known as Windows. Apple introduced the iPod and the iPhone.



### 2 How is a monopoly created?

#### barrier to entry

Anything that impedes the ability of firms to begin a new business in an industry in which existing firms are earning positive economic profits.

**1.b.3. Government** Barriers to entry are often created by governments. The U.S. government issues patents, which provide a firm with a monopoly on certain products, inventions, or discoveries for a period of 20 years. Such was the case with the Glaxo-Wellcome monopoly. The company was granted a patent on AZT and thus was, by law, the only supplier of the drug. Domestic government policy also restricts entry into many industries. The federal government issues broadcast licenses for radio and television and grants airlines landing rights at certain airports. City governments limit the number of taxi companies that can operate, the number of cable television companies that can provide service, and the number of garbage collection firms that can provide service. State and local governments issue liquor licenses, cosmetology licenses (for hair cutters), contractor licenses, and many other licenses to carry on business, and restrict the number of electric utility, cable, satellite, garbage collection, and other companies. These are just a few examples of government-created monopolies in the United States.

### 1.c. Types of Monopolies

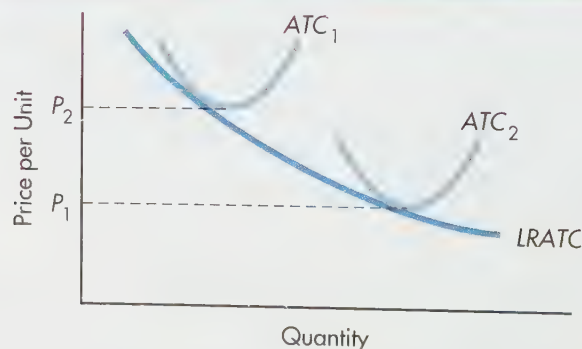
#### natural monopoly

A monopoly that arises from economies of scale.

The word *monopoly* is often part of another term, such as *natural monopoly*, *local monopoly*, *regulated monopoly*, *monopoly power*, and *monopolization*. A **natural monopoly** is a firm that has become a monopoly because of economies of scale and demand conditions. The adjective *natural* indicates that the monopoly arises from cost and demand conditions, not from government action. If costs decline as the quantity produced rises, only very large producers will be able to stay in business. Their lower costs will enable them to force smaller producers, who have higher costs, out of business. Large producers can underprice smaller producers, as illustrated in Figure 1. The larger firm, operating along  $ATC_2$ , can set a price anywhere between  $P_1$  and  $P_2$  that is lower than the smaller firm, operating along  $ATC_1$ , can sell its products at and still survive. If the market can support only one producer or if the long-run average-total-cost curve continually slopes downward, the monopoly that results is said to be natural.

Electric utilities are often considered to be natural monopolies because there are large economies of scale in the generation of electricity. One large power plant can generate electricity at a lower cost per kilowatt-hour than can several small power plants. The transmission of electricity is different, however. There are diseconomies of scale in

**FIGURE 1** Economies of Scale



A large firm producing along  $ATC_2$  can produce output much less expensively per unit than a small firm operating along  $ATC_1$ . The large firm, therefore, can set a price that is below the minimum point of the small firm's average-total-cost curve, yet still earn profit. Any price between  $P_1$  and  $P_2$  will provide a profit for the large firm and a loss for the small firm.



Christopher Morris/VLC Corbis

Most monopolies occur because the government tells the business that it can have an exclusive operation without worrying about entry or competition. In much of the world, the oil monopoly is owned by the government. For instance, in this photo, we see the operations control room at the Aramco Saudi national oil company in Ras Tanura, Dammam, Saudi Arabia. The Aramco Saudi national oil company is the state-run monopoly oil producer in Saudi Arabia.

the transmission of electricity. The farther electricity has to be transmitted, the higher the cost per kilowatt-hour. Together, generation and transmission imply an MES (minimum efficient scale) that is sufficiently large for a local monopoly but not for a national or international monopoly.

A **local monopoly** is a firm that has a monopoly within a specific geographic area. An electric utility may be the sole supplier of electricity in a municipality or local area. A taxicab company may have a monopoly for service to the airport or within a city. Cable TV companies may have monopolies within municipalities. An airline may have a monopoly over some routes.

A **regulated monopoly** is a monopoly whose prices and production rates are controlled by a government entity. Electric utility companies, telephone companies, cable TV companies, and water companies are or have been regulated monopolies. A state corporation or utility commission sets their rates, determines the costs to be allowed in the production of their services, and restricts entry by other firms.

**Monopoly power** is market power, the ability to set prices rather than just be a price taker. Market power exists whenever the demand curve facing the producer is downward sloping. All firms except those operating in perfectly competitive markets have some monopoly power. A firm that has monopoly power is a **price maker** rather than a price taker. A firm that has to lower prices to sell more is a price maker—it will maximize profit by finding the quantity where  $MR = MC$  and then setting price according to demand.

**Monopolization** refers to the attempt by a firm to take over a market—that is, the attempt to become the only supplier of a good or service. As we'll discuss in the chapter “Antitrust and Regulation,” the law forbids monopolization even though it does not always forbid monopolies.

#### local monopoly

A monopoly that exists in a limited geographic area.

#### regulated monopoly

A monopoly firm whose behavior is monitored and prescribed by a government entity.

#### monopoly power

Market power, the ability to set prices.

#### price maker

A firm that sets the price of the product it sells.

#### monopolization

An attempt by a firm to dominate a market or become a monopoly.



## RECAP

1. A monopoly firm is the sole supplier of a product for which there are no close substitutes.
2. A monopoly firm remains the sole supplier because of barriers to entry.
3. Barriers to entry may be economic, such as economies of scale; they may be due to the exclusive ownership of an essential resource; or they may be created by government policy.
4. A natural monopoly is a monopoly that results from economies of scale. A regulated monopoly is a monopoly whose pricing and production are controlled by the government. A local monopoly is a firm that has a monopoly in a specific geographic region.
5. Monopoly power, or market power, is when a firm can set prices rather than just be a price taker.

## 2. The Demand Curve Facing a Monopoly Firm

In any market, the market demand curve is a downward-sloping line because of the law of demand. Although the marketing demand curve is downward sloping, the demand curve facing an individual firm in a perfectly competitive market is a horizontal line at the market price. This is not the case for a monopoly. Because a monopolist is the only producer, it is the industry, so its demand curve is the market demand curve; it slopes down.



- 3** What does the demand curve for a monopoly firm look like, and why?

*The demand curve facing the monopoly firm is the market demand curve.*

### 2.a. Marginal Revenue

In 2004, Apple introduced the iPod. Throughout the year, Apple had a monopoly on the iPod. Let's consider the firm's pricing and output decisions, using hypothetical cost and revenue data.

Suppose an iPod sells for \$150, and, at that price, the firm is selling 5 iPods per day, as shown in Figure 2. If Apple wants to sell more, it must move down the demand curve. Why? Because of the law of demand. People will do without the iPod rather than pay more than they think it's worth. As the price declines, more people are willing and able to purchase an iPod—sales increase. The table in Figure 2 shows that if the monopoly firm lowers the price to \$135 per unit from \$140, it will sell 8 iPods per day instead of 7.

What is the firm's marginal revenue? To find marginal revenue, the total revenue earned at \$140 per iPod must be compared to the total revenue earned at \$135 per iPod—the change in total revenue must be calculated. At \$140 apiece, 7 iPods are sold each day, and total revenue each day is

$$\$140 \text{ per iPod} \times 7 \text{ iPods} = \$980$$

At \$135 apiece, 8 iPods are sold, and total revenue is

$$\$135 \text{ per iPod} \times 8 \text{ iPods} = \$1,080$$

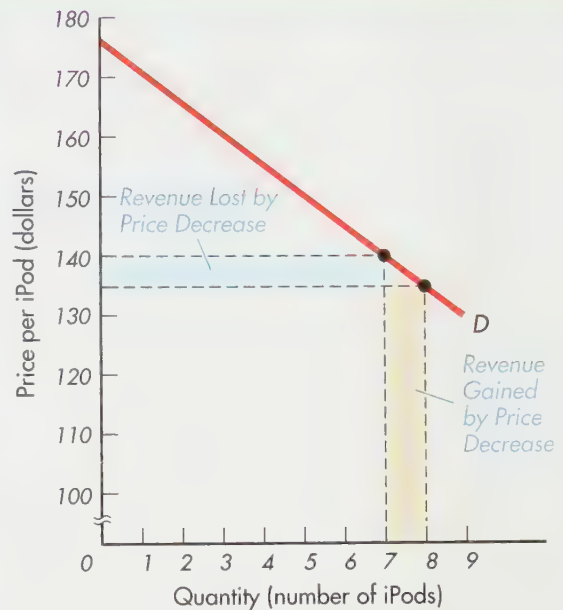
The difference, change in total revenue, is \$100. Thus, marginal revenue is

$$\frac{\Delta TR}{\Delta Q} = \frac{\$100}{1 \text{ iPod}} = \$100$$

The change in revenue is the difference between the increased revenue due to the increased quantity sold, the yellow area in Figure 2, and the decreased revenue due to a lower price, the blue area in Figure 2.

**FIGURE 2** Demand Curve for a Monopolist

| Quantity per Day | Price | Total Revenue | Marginal Revenue |
|------------------|-------|---------------|------------------|
| 1                | \$170 | \$ 170        | \$170            |
| 2                | \$165 | \$ 330        | \$160            |
| 3                | \$160 | \$ 480        | \$150            |
| 4                | \$155 | \$ 620        | \$140            |
| 5                | \$150 | \$ 750        | \$130            |
| 6                | \$145 | \$ 870        | \$120            |
| 7                | \$140 | \$ 980        | \$110            |
| 8                | \$135 | \$1,080       | \$100            |
| 9                | \$130 | \$1,170       | \$ 90            |



As the iPod price is reduced, the quantity demanded increases. But because the price is reduced on all quantities sold, not just on the last unit sold, marginal revenue declines faster than price.

The price is \$135 per iPod, but marginal revenue is \$100 per iPod. Price and marginal revenue are not the same for a monopoly firm. This is a fundamental difference between a monopolist and a perfect competitor. For a perfect competitor, price and marginal revenue are the same.

Marginal revenue is less than price and declines as output rises because the monopolist must lower the price in order to sell more units. When the price of an iPod is \$140, the firm sells 7 iPods. When the price is dropped to \$135, the firm sells 8 units. The firm does not sell the first 7 iPods for \$140 and the 8th one for \$135. It might lose business if it tried to do that. The customer who purchased the iPod at \$135 could sell it for \$137.50 to a customer who was about to pay \$140, and the firm would lose the \$140 sale. Customers who would have paid \$140 could decide to wait until they too can get the \$135 price. As long as customers know about the prices paid by other customers and as long as the firm cannot easily distinguish among customers, the monopoly firm is not able to charge a different price for each additional unit. All units are sold at the same price, and in order to sell additional units, the monopolist must lower the price on all units. As a result, marginal revenue and price are not the same.

*Marginal revenue is less than price for a monopoly firm.*

**2.a.1. Marginal and Average Revenue** Recall from the chapters “Elasticity: Demand and Supply” and “Profit Maximization” that whenever the marginal is greater than the average, the average rises, and whenever the marginal is less than the average, the average falls. Average revenue is calculated by dividing total revenue by the number of units of output sold.

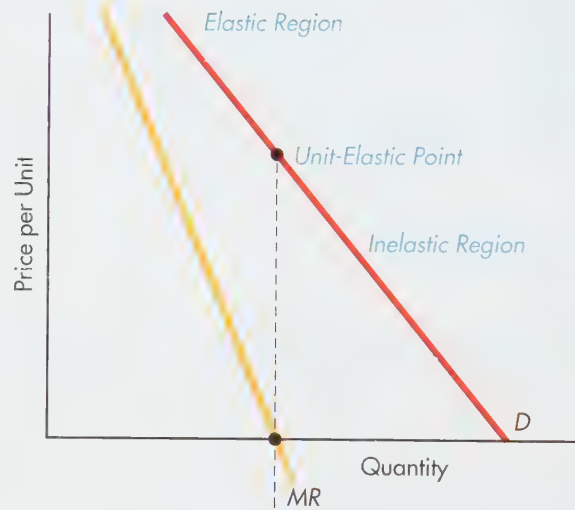
At a price of \$150 per iPod, average revenue is  $AR = \$750/5 = \$150$ . At a price of \$145, average revenue is  $AR = \$870/6 = \$145$ . Average revenue is the same as price; in fact, *the average-revenue curve is the demand curve*. Because of the law of demand, where quantity demanded rises as price falls, average revenue (price) always falls as output rises (the demand curve slopes downward). Because average revenue falls as output rises,

marginal revenue must always be less than average revenue. For the monopolist (or any firm facing a downward-sloping demand curve), marginal revenue always declines as output increases, and the marginal revenue curve always lies below the demand curve.

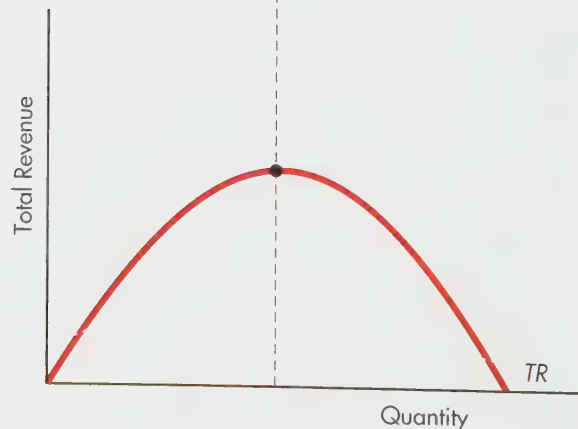
Also recall from previous chapters that the marginal-revenue curve is positive in the elastic region of the demand curve, is zero at the output level where the demand curve is unit-elastic, and is negative in the inelastic portion of the demand curve.<sup>1</sup> This is illustrated in Figure 3.

**FIGURE 3** Downward-Sloping Demand Curve and Revenue

**(a) Demand and Price Elasticity**



**(b) Total Revenue**



The straight-line downward-sloping demand curve in Figure 3(a) shows that the price elasticity of demand becomes more inelastic as we move down the curve. At the top of the curve in the elastic region, revenue increases as price is lowered, as shown in Figure 3(b); in the inelastic region, the lower part of the curve, revenue decreases as price is lowered. The revenue-maximizing point, the top of the curve in Figure 3(b), occurs where the demand curve is unit-elastic, shown in Figure 3(a).

<sup>1</sup> The slope of the demand curve is one-half the slope of the marginal-revenue curve. Consider the demand formula  $P = a - bQ$ ; total revenue is  $PQ = aQ - bQ^2$ , so marginal revenue is  $MR = a - 2bQ$ .



## RECAP

1. The demand curve facing a monopoly firm is the market demand curve.
2. For the monopoly firm, price is greater than marginal revenue. For the perfectly competitive firm, price and marginal revenue are equal.
3. As price declines, total revenue increases in the elastic portion of the demand curve, reaches a maximum at the unit-elastic point, and declines in the inelastic portion.
4. The marginal-revenue curve of the monopoly firm lies below the demand curve.
5. For both the perfectly competitive firm and the monopoly firm, price = average revenue = demand.

## 3. Profit Maximization

The objective of the monopoly firm is to maximize profit. Where does the monopolist choose to produce, and what price does it set? Recall from the chapter “Profit Maximization” that all profit-maximizing firms produce at the point where marginal revenue equals marginal cost.

### 3.a. What Price to Charge?

A schedule of revenues and costs for the iPod producer accompanies Figure 4. Total revenue ( $TR$ ) is listed in column 3; total cost ( $TC$ ), in column 4. Total profit ( $TR - TC$ ), shown in column 5, is the difference between the entries in column 3 and those in column 4. Marginal revenue ( $MR$ ) is listed in column 6, marginal cost ( $MC$ ) in column 7, and average total cost ( $ATC$ ) in column 8.

The quantity of output to be produced is the quantity that corresponds to the point where  $MR = MC$ . How high a price will the market bear at that quantity? The market is willing and able to purchase the quantity given by  $MR = MC$  at the corresponding price on the demand curve. As shown in Figure 4(a), the price is found by drawing a vertical line from the point where  $MR = MC$  up to the demand curve and then extending a horizontal line over to the vertical axis. That price is \$135 when output is 8.

### 3.b. Monopoly Profit and Loss

The profit that the monopoly firm generates by selling 8 iPods at a price of \$135 is shown in Figure 4(a) as the colored rectangle. The vertical distance between the  $ATC$  curve and the demand curve, multiplied by the quantity sold, yields total profit.

Just like any other firm, a monopoly firm could experience a loss. A monopoly supplier of sharpeners for disposable razor blades probably would not be very successful, and the U.S. Postal Service has failed to make a profit in five of the last ten years. Unless price exceeds average total costs, the firm loses money. A monopolist producing at a loss is shown in Figure 4(b)—the price is less than the average total cost.

Like a perfectly competitive firm, a monopolist will suspend operations in the short run if its price does not exceed the average variable cost at the quantity the firm produces. And, like a perfectly competitive firm, a monopolist will shut down permanently if revenue is not likely to equal or exceed all costs in the long run (unless the government subsidizes the firm, as it does in the case of the U.S. Postal Service). In contrast, however, if a monopolist makes a profit, barriers to entry will keep other firms out of the industry. As a result, the monopolist can earn above-normal profits in the long run.

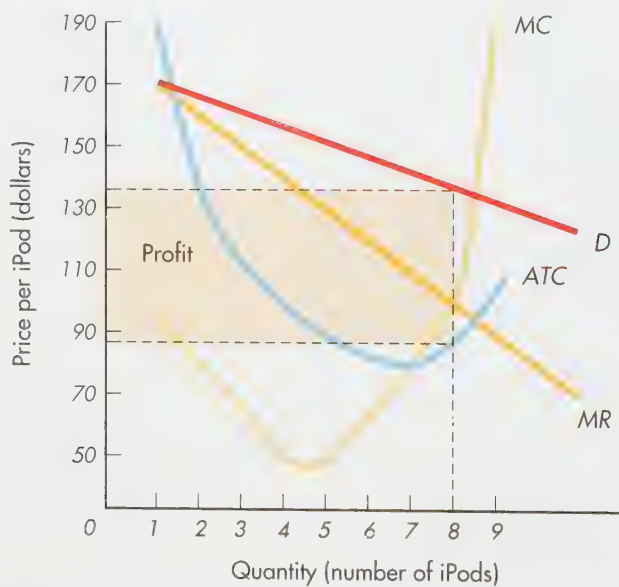
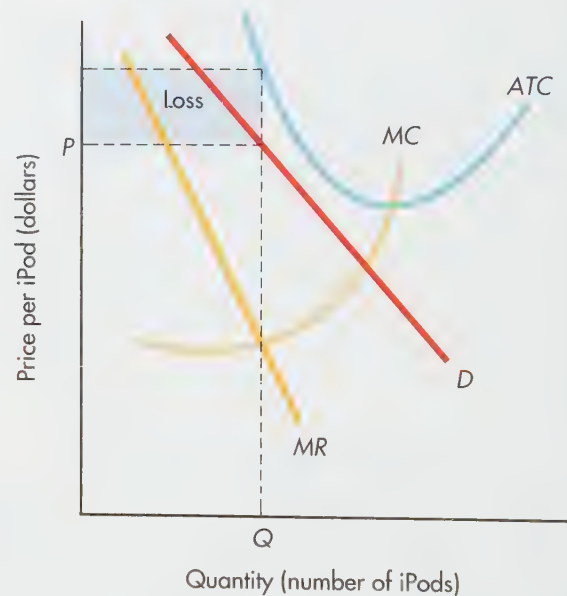


- 4 Why would someone want to have a monopoly in some business or activity?

*A monopolist can earn above-normal profits in the long run.*

**FIGURE 4** Profit Maximization for the iPod Seller

| (1)<br>Total<br>Output<br>(Q) | (2)<br>Price<br>(P) | (3)<br>Total<br>Revenue<br>(TR) | (4)<br>Total<br>Cost<br>(TC) | (5)<br>Total<br>Profit<br>(TR - TC) | (6)<br>Marginal<br>Revenue<br>(MR) | (7)<br>Marginal<br>Cost<br>(MC) | (8)<br>Average<br>Total Cost<br>(ATC) |
|-------------------------------|---------------------|---------------------------------|------------------------------|-------------------------------------|------------------------------------|---------------------------------|---------------------------------------|
| 0                             | \$175               | \$ 0                            | \$100                        | \$100                               |                                    |                                 |                                       |
| 1                             | \$170               | \$ 170                          | \$200                        | \$ 30                               | \$170                              | \$100                           | \$200                                 |
| 2                             | \$165               | \$ 330                          | \$280                        | \$ 50                               | \$160                              | \$ 80                           | \$140                                 |
| 3                             | \$160               | \$ 480                          | \$350                        | \$130                               | \$150                              | \$ 70                           | \$117                                 |
| 4                             | \$155               | \$ 620                          | \$400                        | \$220                               | \$140                              | \$ 50                           | \$100                                 |
| 5                             | \$150               | \$ 750                          | \$450                        | \$300                               | \$130                              | \$ 50                           | \$ 90                                 |
| 6                             | \$145               | \$ 870                          | \$520                        | \$350                               | \$120                              | \$ 70                           | \$ 87                                 |
| 7                             | \$140               | \$ 980                          | \$600                        | \$380                               | \$110                              | \$ 80                           | \$ 86                                 |
| 8                             | \$135               | \$1,080                         | \$700                        | \$380                               | \$100                              | \$100                           | \$ 88                                 |
| 9                             | \$130               | \$1,170                         | \$900                        | \$270                               | \$ 90                              | \$200                           | \$100                                 |

**(a) Making a Profit****(b) Operating at a Loss**

The data listed in the table are plotted in Figure 4(a). The firm produces where  $MR = MC$ , 8 units; charges a price given by the demand curve directly above the production of 8 units, a price of \$135 per iPod; and earns a profit (yellow rectangle). In Figure 4(b), the firm is shown to be operating at a loss (blue rectangle). It produces output  $Q$  at price  $P$ , but the average total cost exceeds the price.

### 3.c. Supply and the Monopoly Firm

For the firm in perfect competition, the supply curve is that portion of the marginal cost curve that lies above the average-cost curve, and the market-supply curve is the sum of all the individual firms' supply curves. The supply curve for the firm selling in any of the other market structures is not as straightforward to derive, and, therefore, neither is the market supply curve. The reason is that firms selling in market structures other than

perfect competition are price makers rather than price takers. This means that the hypothetical experiment of varying the price of a product and seeing how the firm selling that product reacts makes no sense.

In the case of the monopolist, the firm supplies a quantity determined by setting marginal revenue equal to marginal cost, but it also sets the price to go along with this quantity. Varying the price will not change the decision rule, since the firm will choose to produce at its profit-maximizing output level and set the price accordingly. There is, therefore, only one quantity and price at which the monopolist will operate. There is a supply point, not a supply curve. Moreover, because the monopolist is the only firm in the market, its supply curve (or supply point) is also the market supply curve (or point).

The complications of the price makers do not alter the supply rule: A firm will produce and offer for sale a quantity that equates marginal revenue with marginal cost. This supply rule applies to all firms, regardless of the market structure in which the firm operates.

### 3.d. Monopoly Myths

There are a few myths about monopoly that we have debunked here. The first myth is that a monopolist can charge any price it wants and will reap unseemly profits by continually increasing the price. We know that a monopolist maximizes profit by producing the quantity that equates marginal revenue and marginal cost. We also know that a monopolist can price and sell only the quantities given by the demand curve. If the demand curve is very inelastic, as would be the case for a life-saving pharmaceutical, then the price the monopolist will charge will be high. Conversely, if demand is price elastic, the monopolist will not be able to sell its good or service if it charges exorbitant prices.

A second myth is that a monopolist is not sensitive to customers. The monopolist can stay in business only if it earns at least a normal profit (unless a government entity subsidizes the money-losing monopolist). Ignoring customers, producing a good that no one will purchase, setting prices that all customers think are exorbitant, and providing terrible service or products that customers do not want, will not allow a firm to remain in business for long.

The third myth is that the monopolist cannot make a loss. A monopolist is no different from any other firm in that it has costs of doing business and it must earn sufficient revenues to pay those costs. If the monopolist sets too high a price or provides a product that few people want, revenues may be less than costs and losses may result.

## RECAP

1. Profit is maximized at the output level where  $MR = MC$ .
2. The price charged by the monopoly firm is the point on the demand curve that corresponds to the quantity where  $MR = MC$ .
3. A monopoly firm can make profits or experience losses. A monopoly firm can earn above-normal profit in the long run.
4. The monopoly firm will shut down in the short run if all variable costs aren't covered. It will shut down in the long run if all costs aren't covered.
5. The amount that a firm is willing and able to supply depends on marginal revenue and marginal cost. A firm will produce and offer for sale a quantity that equates marginal revenue and marginal cost.



## 4. Market Power and Price Discrimination

### price discrimination

Charging different customers different prices for the same product.



- 5 Under what conditions will a monopolist charge different customers different prices for the same product?

Market power is the ability of a firm to determine the price of the good or service it offers for sale. Perfectly competitive firms have no market power; all other firms do. With market power, a firm can choose to charge more and sell less or to charge less and sell more. Under certain conditions, a firm with market power is able to charge different customers different prices. This is called **price discrimination**. Figure 5 shows the demand curve facing a firm with market power. Notice that the demand curve tells us that at price  $P_1$ , consumers are willing and able to purchase quantity  $Q_1$ . If the price is  $P_2$ , they are willing and able to purchase  $Q_2$ . If the firm sells to everyone at the same price, say  $P_2$ , it does not make as much money as it would if it could charge some customers, those who were willing and able to pay a higher price,  $P_1$ , and other customers  $P_2$ . It could sell quantity  $Q_1$  at price  $P_1$  and quantity  $Q_2 - Q_1$  at price  $P_2$ . What would be even better for the firm would be to charge each customer what that customer was willing and able to pay. This is price discrimination; price discrimination enables the firm to capture consumer surplus for itself.

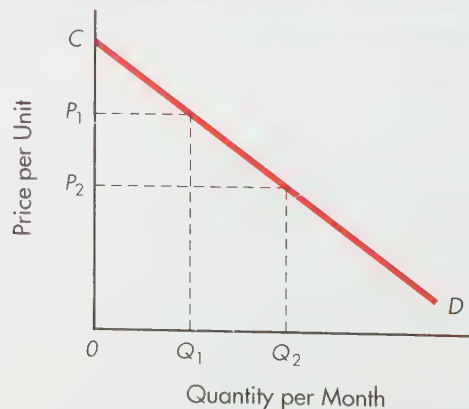
### 4.a. Necessary Conditions for Price Discrimination

You read in Section 2.a that the monopoly firm has to sell all of its products at a uniform price; otherwise, one customer could sell to another, thereby reducing the monopoly firm's profit. However, if customers do not come into contact with each other or are somehow separated by the firm, the firm may be able to charge each customer the exact price that he or she is willing to pay.

When different customers are charged different prices for the same product or when customers are charged different prices for different quantities of the same product, price discrimination is occurring. Price discrimination occurs when price changes result not from cost changes but from the firm's attempt to extract more of the consumer surplus. Certain conditions are necessary for price discrimination to occur:

- The firm cannot be a price taker (perfect competitor).
- The firm must be able to separate customers according to price elasticities of demand.
- The firm must be able to prevent resale of the product.

**FIGURE 5** Price Discrimination



If the firm can charge a price equal to what each person is willing and able to pay, the firm essentially collects the consumer surplus instead of the consumer. In this figure, the firm is charging one set of customers price  $P_1$  and another set of customers price  $P_2$ .

## 4.b. Examples of Price Discrimination

Examples of price discrimination are not hard to find. Senior citizens often pay a lower price than the general population at movie theaters, drugstores, and golf courses. It is relatively easy to identify senior citizens and to ensure that they do not resell their tickets to the general population.

Tuition at state schools is different for in-state and out-of-state residents. It is not difficult to find out where a student resides, and it is very easy to ensure that in-state students do not sell their places to out-of-state students. Airlines discriminate between business passengers and others. Passengers who do not fly at the busiest times, who purchase tickets in advance, and who can stay at their destination longer than a day pay lower fares than business passengers, who cannot make advance reservations and who must travel during rush hours. It is relatively easy for the airlines to separate business from nonbusiness passengers and to ensure that the latter do not sell their tickets to the former.

Electric utilities practice a form of price discrimination by charging different rates for different quantities of electricity used. The rate declines as the quantity purchased increases. A customer might pay \$.07 per kilowatt-hour for the first 100 kilowatt-hours, \$.06 for the next 100, and so on. Many utility companies have different rate structures for different classes of customers as well. Businesses pay less per kilowatt-hour than households.

Grocery coupons, mail-in rebates, trading stamps, and other discount strategies are also price-discrimination techniques. Shoppers who are willing to spend time cutting out coupons and presenting them receive a lower price than those who are not willing to spend that time. Shoppers are separated by the amount of time they are willing to devote to coupon clipping. Is it possible that the popcorn at the movies is also a price-discrimination tactic? If the excess price of the popcorn and other foodstuffs at the movies was simply added to the price of an admission ticket, the movie theater would lose some of those customers who do not purchase popcorn. By charging a high price for the popcorn, the movie theater is distinguishing those customers who have a lower price elasticity of demand for the entire package of the movie and the popcorn from those with a higher elasticity of demand.

## ECONOMIC INSIGHT

### Groupon

In 2008, a new form of price discrimination began through a company known as Groupon. Groupon is a website that offers a "deal of the day" to major geographic markets worldwide. The first market for Groupon was Chicago, followed soon thereafter by Boston, New York City, and Toronto. By 2011, Groupon served more than 150 markets in North America and 100 markets in Europe, Asia, and South America, and has amassed 35 million registered users. The company offers one coupon per day in each of the markets it serves. If a certain number of people sign up for the offer, then the deal becomes available to all who have a coupon. If the predetermined minimum is not met, no one gets

the deal that day. Groupon makes money by keeping approximately half the money the person pays for the coupon. So, for example, an \$80 massage could be purchased by the consumer for \$40 and then Groupon and the retailer would split the \$40. That is, the retailer gives a massage valued at \$80 and gets approximately \$20 from Groupon for it. And the consumer gets the massage, in this example, from the retailer for which they have paid \$40 to Groupon. Groupon is helping retailers discriminate between those willing to spend the time getting online, signing up for the deal, and waiting until the deal is consummated, from those not willing to spend time and effort dealing with the coupons.

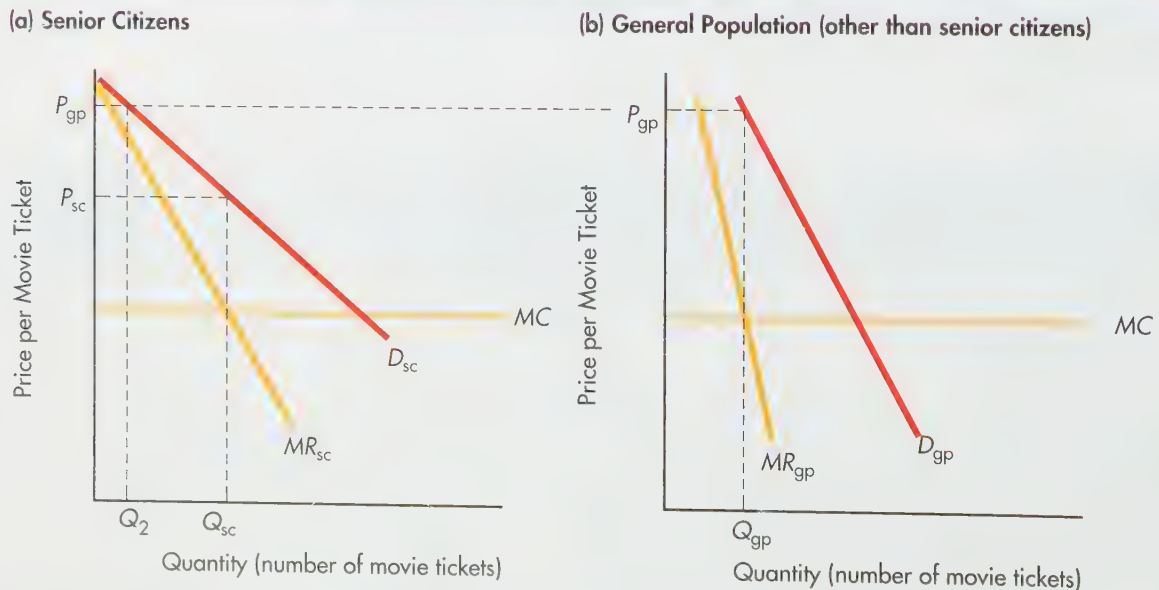
### 4.c. The Theory of Price Discrimination

How does price discrimination work? Suppose there are two classes of buyers for movie tickets, senior citizens and everybody else, and each class has a different price elasticity of demand. The two classes are shown in Figure 6. Profit is maximized when  $MR = MC$ . Because the same firm is providing the goods in two submarkets,  $MC$  is the same for senior citizens and the general public, but the demand curves differ. Because the demand curves of the two groups differ, there are two  $MR$  curves:  $MR_{sc}$  for senior citizens, in Figure 6(a), and  $MR_{gp}$  for the general population, in Figure 6(b). Profit is maximized when  $MR_{sc} = MC$  and when  $MR_{gp} = MC$ . The price is found by drawing a vertical line from the quantities where  $MR = MC$  up to the respective demand curves,  $D_{sc}$  and  $D_{gp}$ .

Notice that the price to the general population,  $P_{gp}$ , is higher than the price to the senior citizens,  $P_{sc}$ . The reason is that the senior citizens demand curve is more elastic than the demand curve of the general population. Senior citizens are more sensitive to price than is the general population, so to attract more of their business, the merchant has to offer them a lower price.

By discriminating, a monopoly firm makes greater profits than it would make by charging both groups the same price. If both groups were charged the same price,  $P_{gp}$ , the monopoly firm would lose sales to senior citizens who found the price too high,  $Q_{sc}$  to  $Q_2$ . And if both groups were charged  $P_{sc}$ , so few additional sales to the general population would be made that revenues would fall. A firm with market power could collect the entire consumer surplus if it could charge each customer exactly the price that that customer was willing and able to pay. This is called *perfect price discrimination*.

**FIGURE 6** Price Discrimination in Action



There are two classes of buyers for the same product. Figure 6(a) shows the elasticity of demand for senior citizens. Figure 6(b) shows the elasticity of demand for the general population. The demand of the senior citizens is more elastic than that of the general population. As a result, faced with the same marginal cost, the firm charges senior citizens a lower price than it charges the rest of the population. The quantity sold to senior citizens is  $Q_{sc}$ , the intersection between  $MC$  and  $MR_{sc}$ , and the price charged is  $P_{sc}$ . The quantity sold to the general population is  $Q_{gp}$ , and the price charged is  $P_{gp}$ .



## RECAP

1. Price discrimination occurs when a firm charges different customers different prices for the same product or charges different prices for different quantities of the same product.
2. Three conditions are necessary for price discrimination to occur: (a) the firm must have some market

power, (b) the firm must be able to separate customers according to price elasticities of demand, and (c) the firm must be able to prevent resale of the product.

## 5. Comparison of Perfect Competition and Monopoly

Because perfect competition and monopoly are bookends—opposites that are intended to surround all business behavior—it is useful to compare the outcome of the two.

### 5.a. Costs of Monopoly: Inefficiency

In the long run, the perfectly competitive firm operates at the minimum point of the long-run average-total-cost curve, and the firm's price is equal to its marginal cost. Profit is at the normal level. A monopolist does not operate at the minimum point of the average-total-cost curve and does not set price equal to marginal cost. Because entry does not occur, a monopoly firm may earn above-normal profit in the long run.

Figure 7(a) shows a perfectly competitive market. The market demand curve is  $D$ ; the market supply curve is  $S$ . The market price determined by the intersection of  $D$  and  $S$  is  $P_{pc}$ . At  $P_{pc}$ , the perfectly competitive market produces  $Q_{pc}$ . Consumers are able to enjoy the consumer surplus indicated by the triangle  $P_{pc}BA$  by purchasing the quantity  $Q_{pc}$  at the price  $P_{pc}$ . Firms receive the producer surplus indicated by triangle  $OBP_{pc}$  by producing the quantity  $Q_{pc}$  and selling that quantity at price  $P_{pc}$ .

To compare these results to monopoly, we must assume that all of the firms in a perfectly competitive industry are merged into a single monopoly firm and that the monopolist does not close or alter plants and does not achieve any economies of scale. In other words, what would occur if a perfectly competitive industry were transformed into a monopoly—just one firm that determines price and quantity produced? The market demand curve becomes the monopoly firm's demand curve, and the market supply curve becomes the monopoly firm's marginal-cost curve. Recall that a firm will supply the quantity given by the point where marginal revenue equals marginal-cost curve (above the average-variable-cost curve). This is illustrated in Figure 7(b).

The monopoly firm restricts quantity produced to  $Q_m$ , where  $MR = MC$ , and charges a price  $P_m$ , as indicated on the demand curve shown in Figure 7(b). *The monopoly firm thus produces a lower quantity than does the perfectly competitive market,  $Q_m$  compared to  $Q$ , and sells that smaller quantity at a higher price,  $P_m$  compared to  $P_{pc}$ .* In addition, the consumer surplus in monopoly is the triangle  $P_mCA$ , which is smaller than the consumer surplus under perfect competition,  $P_{pc}BA$ . The rectangle  $P_{pc}ECP_m$  is part of consumer surplus in perfect competition. In monopoly, that part of consumer surplus is transferred to the firm. The total producer surplus is area  $0FCP_m$ .

Thus, firms are better off (more producer surplus) while consumers are worse off (less consumer surplus) under monopoly compared to perfect competition. Consumers are worse off by area  $P_{pc}BCP_m$ , and firms are better off by area  $P_{pc}ECP_m$  less area  $EFB$ .



- 6 How do the predictions of the models of perfect competition and monopoly differ?

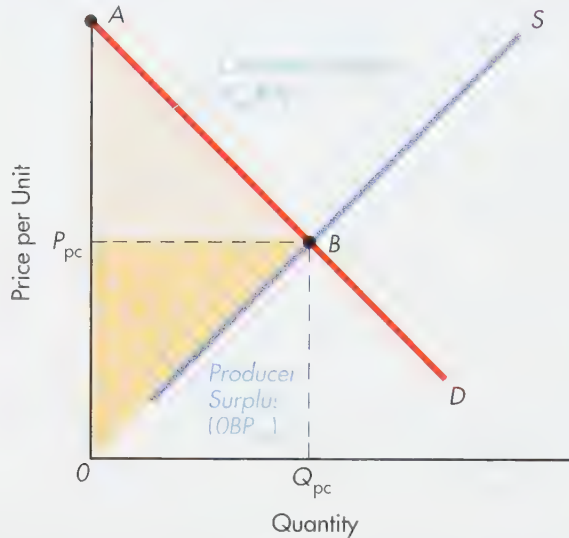
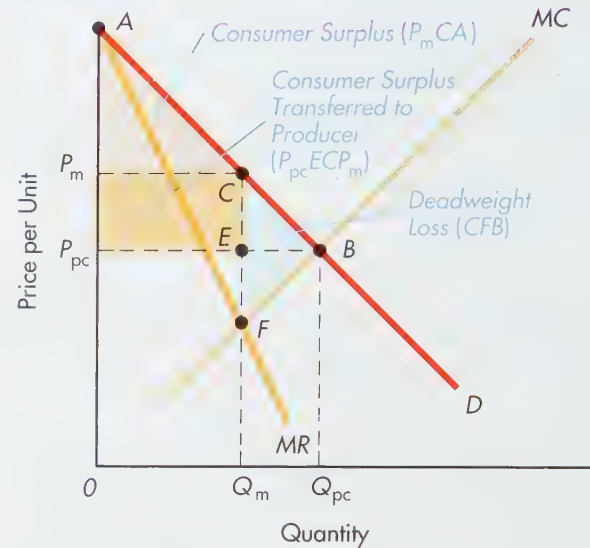
**FIGURE 7** Monopoly and Perfect Competition Compared**(a) The Perfectly Competitive Market****(b) Monopoly**

Figure 7(a) shows a perfectly competitive industry; it produces at the point where demand,  $D$ , and industry supply,  $S$ , intersect. The quantity produced by the industry is  $Q_{pc}$ ; the price charged is  $P_{pc}$ . Consumer surplus is the triangle  $P_{pc}BA$ . Figure 7(b) shows what happens if the industry is monopolized. The single firm faces the industry demand curve,  $D$ , and has the marginal-revenue curve  $MR$ . The intersection of the marginal-cost curve and the marginal-revenue curve indicates the quantity that will be produced,  $Q_m$ . The price charged for  $Q_m$  is  $P_m$ . Thus, the monopoly firm produces less and charges more than the perfectly competitive industry. Consumer surplus, shown as the triangle  $P_mCA$ , is smaller in the monopoly industry. The area  $P_{pc}ECP_m$  is the consumer surplus in perfect competition that is transferred from consumer to producer. The producer surplus is area  $0FCP_m$ . The deadweight loss is the area  $CFB$ .

### deadweight loss

The reduction of consumer surplus without a corresponding increase in profit when a perfectly competitive firm is monopolized.

The consumer and producer surplus represented by triangle  $CFB$  is lost by both consumers and firms and goes to no one. This loss is the reduction in consumer surplus and producer surplus that is not transferred to the monopoly firm or to anyone else; it is called a **deadweight loss**.

## RECAP

1. A monopoly firm produces a smaller quantity and charges a higher price than a perfectly competitive industry if the two industries have identical costs.
2. The consumer surplus is smaller if an industry is operated by a monopoly firm than it is if an industry is operated by perfectly competitive firms. Profits are larger in the monopoly case.
3. The costs to society that result when a perfectly competitive industry becomes a monopoly are a reduction of consumer surplus and producer surplus that is not transferred to anyone. This loss is called a **deadweight loss**.

## SUMMARY

### 1. What is monopoly?

- Monopoly is a market structure in which there is a single supplier of a product. A monopoly firm, or monopolist, is the only supplier of a product for which there are no close substitutes. §1.a

### 2. How is a monopoly created?

- Natural barriers to entry (such as economies of scale), barriers erected by firms in the industry, and barriers erected by government may create monopolies. §1.b
- A natural monopoly refers to a monopoly that exists due to economies of scale. A local monopoly is a monopoly that applies only to a niche of the market or to a small geographical area. A regulated monopoly is a firm whose price and output are controlled by a government entity. Monopoly power refers to market power or the ability a firm has to set prices rather than act as a price taker. §1.c

### 3. What does the demand curve for a monopoly firm look like, and why?

- Because a monopolist is the only producer of a good or service, the demand curve facing a monopoly firm is the industry demand curve. §2
- Price and marginal revenue are not the same for a monopoly firm. Marginal revenue is less than price. §2.a
- The average-revenue curve is the demand curve. §2.a.1
- A monopoly firm maximizes profit by producing the quantity of output yielded at the point where

marginal revenue and marginal cost are equal. §3.a

- A monopoly firm sets a price that is on the demand curve and that corresponds to the point where marginal revenue and marginal cost are equal. §3.a

### 4. Why would someone want to have a monopoly in some business or activity?

- A monopoly firm can make above-normal or normal profit or even a loss. If it makes above-normal profit, entry by other firms does not occur and the monopoly firm can earn above-normal profit in the long run. Exit occurs if the monopoly firm cannot cover its costs in the long run. §3.b

### 5. Under what conditions will a monopolist charge different customers different prices for the same product?

- Price discrimination occurs when the firm is not a price taker, can separate customers according to their price elasticities of demand for the firm's product, and can prevent resale of the product. §4.a

### 6. How do the predictions of the models of perfect competition and monopoly differ?

- A comparison of monopoly and perfectly competitive firms implies that monopoly imposes costs on society. These costs include less output being produced and that output being sold at a higher price. §5.a

## KEY TERMS

barrier to entry, 201  
deadweight loss, 214  
local monopoly, 203  
monopolization, 203

monopoly, 201  
monopoly firm (monopolist), 201  
monopoly power, 203  
natural monopoly, 202

price discrimination, 210  
price maker, 203  
regulated monopoly, 203

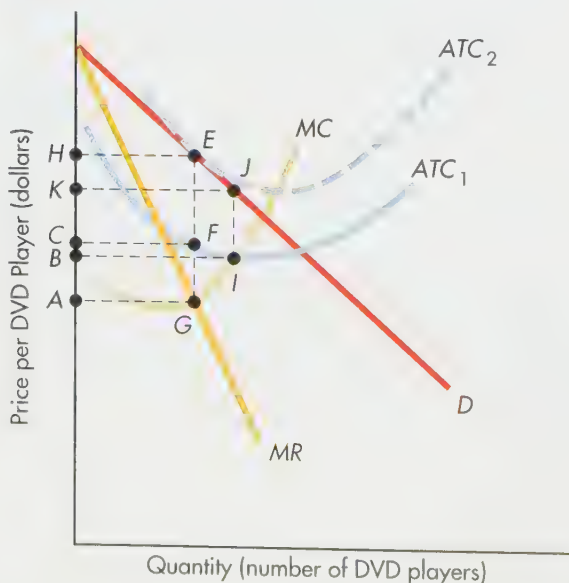


## EXERCISES

- About 85 percent of the soup sold in the United States is Campbell's brand. Is Campbell Soup Company a monopoly firm?
- Price discrimination is practiced by movie theaters, motels, golf courses, drugstores, and universities. Are they monopolies? If not, how can they carry out price discrimination?
- Why is it necessary for the seller to be able to keep customers from reselling the product in order for price discrimination to occur? There are many products for which you get a discount for purchasing large quantities. For instance, most liquor stores will provide a discount on wine if you purchase a case. Is this price discrimination? If so, what is to keep one customer from purchasing cases of wine and then reselling single bottles at a price above the case price but below the liquor store's single-bottle price?
- Many people have claimed that there is no good for which substitutes are not available. If so, does this mean there is no such thing as monopoly?
- Suppose that at a price of \$6 per unit, quantity demanded is 12 units. Calculate the quantity demanded when the marginal revenue is \$6 per unit. (*Hint:* The price elasticity of demand is unity at the midpoint of the demand curve.)
- In the following figure, if the monopoly firm faces  $ATC_1$ , which rectangle measures total profit? If the monopoly firm faces  $ATC_2$ , what is total profit? What information would you need in order to know whether the monopoly firm will shut down or continue producing in the short run? In the long run?
- In recent years, U.S. car manufacturers have charged lower prices for cars in western states in an effort to offset the competition from Japanese cars. This two-tier pricing scheme has upset many car dealers in the eastern states. Many have called it discriminatory and illegal. What conditions are necessary for this pricing scheme to be profitable to the U.S. companies?
- Consider the following demand schedule. Does it apply to a perfectly competitive firm? Compute marginal and average revenue.

| Price | Quantity | Price | Quantity |
|-------|----------|-------|----------|
| \$95  | 2        | \$55  | 5        |
| \$88  | 3        | \$40  | 6        |
| \$80  | 4        | \$22  | 7        |

- Suppose the marginal cost of producing the good in question 8 is a constant \$10 per unit of output. What quantity of output will the firm produce?
- Do you agree or disagree with this statement: "A monopoly firm will charge an exorbitant price for its product"? Explain your answer.
- Do you agree or disagree with this statement: "A monopoly firm will run a much less safe business than a perfect competitor"? Explain your answer.
- State colleges and universities have two levels of tuition or fees. The less expensive is for residents of the state; the more expensive is for nonresidents. Assume that the universities are profit-maximizing monopolists and explain their pricing policy. Now, explain why the colleges and universities give student aid and scholarships.
- Several electric utilities are providing customers with a choice of billing procedures. Customers can select a time-of-day meter that registers electric usage throughout the day, or they can select a regular meter that registers total usage at the end of the day. With the time-of-day meter, the utility is able to charge customers a much higher rate for peak usage than for nonpeak usage. The regular meter users pay the same rate for electric usage no matter when it is used. Why would the electric utility want customers to choose the time-of-day meter?



14. Suppose that a firm has a monopoly on a good with the following demand schedule.

| Price | Quantity | Price | Quantity |
|-------|----------|-------|----------|
| \$10  | 0        | \$4   | 6        |
| \$ 9  | 1        | \$3   | 7        |
| \$ 8  | 2        | \$2   | 8        |
| \$ 7  | 3        | \$1   | 9        |
| \$ 6  | 4        | \$0   | 10       |
| \$ 5  | 5        |       |          |

- a. What price and quantity will the monopolist produce at if the marginal cost is a constant \$4?
- b. Calculate the deadweight loss from having the monopolist produce rather than a perfect competitor.
15. Describe how “quantity discounts” can be price discrimination.
16. Illustrate with a perfectly competitive market (demand and supply) diagram what “gains from trade” are. Now introduce a marginal revenue curve, thereby converting the perfectly competitive market into a monopoly market. Demonstrate how the monopoly reduces gains from trade.

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

## PSST! WANNA BUY A DIAMOND?

*Toronto Star*, December 1, 2005

**F**or almost 100 years, London-based DeBeers and its South African mines had a stranglehold on the diamond industry.

But three major events put an end to the DeBeers cartel: The fall of communism and the Soviet Union in 1989, enabling diamonds to pour out of Russia; the discovery of diamonds in the Northwest Territories in 1991; and the drying up of some of DeBeers' diamond mines in South Africa.

In a nutshell, there is now competition. DeBeers had to rethink its Diamonds are Forever slogan and has given notice to competitors that they are going to have to ante up bucks to push their own gems.

DeBeers' marketing strategy has shifted to branding and the organic nature of diamonds, a change illustrated when the Diamond Trading Company, the marketing arm of DeBeers, brought the world's largest uncut diamond to Toronto last month. The 300-carat treasure, found in South Africa in the 1970s, is the oldest object on the planet, carbon-dated back 3.4 billion years. DeBeers also sponsored *Diamonds: Nature's Miracle*, an international

competition that challenged designers to create an organic piece of jewellery illustrating the "intrinsic value of diamonds and their 3-billion-year struggle to be born."

Canadian Annik Lucier won with a 3-metre long, shimmering diamond strand. She based her design on the ancient belief that diamonds are fallen stars. Her 80-carat strand of 402 diamonds features oval, marquise, princess cut, round brilliant, borealis and rough diamonds and is sold at Birks for \$600,000.

DeBeers and its competitors have also realized the marketing potential of branded diamonds and proprietary cuts.

A proprietary cut is exclusive to one supplier and patented so it cannot be copied by other diamond cutters, explains Kim Sutch, director of Toronto's Diamond Information Centre. DeBeers supplies the diamonds for several proprietary cuts, including the Adura and Tycoon. The Adura (Latin for light on fire), a square princess cut with 27 more facets than the traditional 58-facet princess. The extra facets give the diamond much more sparkle.

The Tycoon is rectangular and similar to an emerald cut. It's referred to as "a diamond with a diamond on top" because of its innovative faceting and prominent top.

Exclusive to Birks is the Amorique. Unveiled in October by Birks creative director Holly Brubach, it is a modern version of the classic round cushion cut, says Paul Lombardi, vice-president of gemstone procurement for Birks.

The Amorique's 70 facets surpass the 58 facets that are the norm for round stones. The extra facets give a lot more dazzling light and the cut eliminates shadowing on the diamond. It represents three years of development and a \$10 million investment. The Amorique collection includes a solitaire, a three-stone ring, drop earrings and pendants, set in 18k gold or platinum and in sizes ranging from 0.25 to 3 carats. Prices start at \$6,500. There is an international waiting list for stones of 2 to 3 carats.

DONNA JEAN MACKINNON

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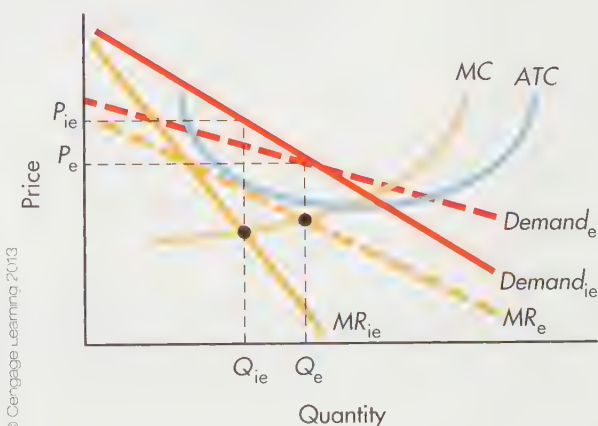
Ask people to name a monopoly and the name that comes up most often is DeBeers. DeBeers never was a true monopolist—the only seller—but it has been the dominant firm in the diamond market for nearly 70 years. The South African company controls over 60 percent of the \$7 billion a year global market for uncut diamonds. Over the years, it has used its dominance of the industry to drive up the price of diamonds by buying up surplus diamonds. The policy dates back to 1934, when the Great Depression caused a slump in diamond prices and the chairman of DeBeers at that time, Sir Ernest Oppenheimer, offered to buy all the rough stones on the market. Had prices continued to fall, the move would have probably led to DeBeers's bankruptcy. But the price recovered, and Sir Ernest's gamble laid the foundation for the company's dominance of the diamond industry for the remainder of the century. DeBeers spent billions of dollars to accumulate a large stockpile of diamonds that were never sold. At the end of 1999, DeBeers's diamond mountain, hoarded in its London vaults, was worth around \$4 billion. The diamonds were used to maintain or manipulate the price. But that practice is changing. DeBeers has announced that it is giving up its traditional role of buyer of last resort of every stone on the market. The reason given for the change is what are called conflict diamonds, diamonds sold by various forces in Africa to fuel civil wars. DeBeers has announced that it will not purchase or trade in conflict diamonds.

While the policy might have some emotional or ethical appeal, the real reason that DeBeers is ending its buyer of last resort strategy is to reduce its declining economic profits. DeBeers knows that if conflict, or blood, diamonds become an emotional consumer issue, they could trigger a public opinion backlash similar to the one that crippled the fur trade. Moreover, rivals such as BHP, an Australian group, and Rio Tinto of the United Kingdom are gaining more and more market share. DeBeers's strategy is two-pronged: to attempt to reduce the supply of diamonds, and to increase the demand.

DeBeers is attempting to become a monopolist again, but through differentiation—it wants to be the only buyer of rough diamonds that are licensed. It is also differentiating its diamonds by the cut. A

proprietary cut is exclusive to one supplier and patented so that it cannot be copied by other diamond cutters, in essence creating a monopoly. The monopoly strategy is illustrated in the figure below. The elastic demand,  $Demand_e$ , and associated marginal revenue,  $MR_e$ , represent the demand for diamonds before successful differentiation. The less elastic demand,  $Demand_{ie}$ , is the result of successful differentiation. The proprietary cut means that people are willing to pay to have a special cut just as they are willing to pay to own a BMW. Differentiation allows the price to be set higher,  $P_{ie}$  as opposed to  $P_e$ .

The various cuts also act as a price discrimination strategy. By selling different cuts at different prices, DeBeers is allowing customers to self-select—those choosing one cut pay more than those choosing another. In this way, a buyer choosing the Adura cut pays a different amount than the buyer choosing the Tycoon cut. Even if the costs of the cuts are virtually identical, the buyer is paying significantly different amounts. Thus, demand,  $Demand_e$ , represents the demand for the Adura while the demand,  $Demand_{ie}$ , represents the demand for the Tycoon. Due to consumer desires (the price elasticities), the price of the Tycoon is higher than the price of the Adura.



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On the demand side, DeBeers spends enormous sums to advertise the gems under its famous slogan, "A diamond is forever."

It is difficult for a monopolist to give up its monopoly power and positive economic profits. DeBeers doesn't plan to do so without a fight.

# Monopolistic Competition and Oligopoly

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## FUNDAMENTAL QUESTIONS

- 1 What is monopolistic competition?
- 2 What behavior is most common in monopolistic competition?
- 3 What is oligopoly?
- 4 In what form does rivalry occur in an oligopoly?
- 5 Why does cooperation among rivals occur most often in oligopolies?
- 6 What are the differences and similarities among the four market structure models?



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In 2009, when Saks Fifth Avenue cut prices by 70 percent, smaller boutiques catering to luxury goods customers had to shut their doors. In 2008, Home Depot offered a low price guarantee: If you find the same item at a lower price, Home Depot will give you your money back plus 10 percent. Home Depot is far from alone in the matching of competitors' prices: Best Buy, Staples, Fry's Electronics, and many other firms also claim a price guarantee. The point of these examples is that firms do not often act independently of other firms. In most cases, a firm must take into account the reactions, responses, and strategies of other firms when implementing a policy. The models of perfect competition and monopoly do not capture these competitive actions. In perfect competition, each firm is so small that it has no impact on the market; in monopoly, there is only one firm. Economists look to two other models of selling environments to capture competitive behavior when



firms take into account the actions of other firms: monopolistic competition and oligopoly. We discuss these two selling environments in this chapter.

Monopolistic competition is like perfect competition in that there are many firms and new firms may enter easily, but it differs from perfect competition in that each firm produces a slightly different product. It is like monopoly in that each firm in monopolistic competition has some market power—each firm has a unique

(slightly differentiated) product. It is unlike monopoly in that there are many close substitutes for the goods and services that each firm produces.

With oligopoly, there are few firms—not one, but not many either. A firm in an oligopoly may sell a product that is identical to that sold by other firms in the oligopoly, or it may sell slightly different products from its competitors. We'll discuss monopolistic competition in the first part of this chapter and oligopoly in the second part.

# 1. Monopolistic Competition

Monopolistic competition is a market structure in which (1) there are a large number of firms, (2) the products produced by the firms are differentiated, and (3) entry and exit occur easily. The definitions of *monopolistic competition* and *perfect competition* overlap. In both structures, there are a large number of firms. The difference is that each firm in monopolistic competition produces a product that is slightly different from all other products, whereas in perfect competition the products are standardized. The definition of monopolistic competition also overlaps with that of *monopoly*. Because each firm in *monopolistic competition* produces a unique product, each has a “mini” monopoly over its product. Thus, like a monopolist, a firm in a monopolistically competitive market structure has a downward-sloping demand curve, marginal revenue is below the demand curve, and price is greater than marginal cost. What distinguishes monopolistic competition from monopoly is ease of entry. Any time firms in monopolistic competition are earning above-normal profit, new firms enter, and this entry continues until firms are earning normal profit. In a monopoly, a firm can earn above-normal profit in the long run. Table 1 summarizes the differences among perfect competition, monopoly, and monopolistic competition.



**1** What is monopolistic competition?

## 1.a. Profits and Entry

Firms in monopolistic competition tend to use product differentiation more than price to compete. They attempt to provide a product for each market niche. Even though the

**TABLE 1** Summary of Perfect Competition, Monopoly, and Monopolistic Competition

|                                | Perfect Competition            | Monopoly                | Monopolistic Competition |
|--------------------------------|--------------------------------|-------------------------|--------------------------|
| <b>Number of firms</b>         | Many                           | One                     | Many                     |
| <b>Type of product</b>         | Identical                      | One                     | Many                     |
| <b>Entry conditions</b>        | Easy                           | Difficult or impossible | Easy                     |
| <b>Demand curve for firm</b>   | Horizontal (perfectly elastic) | Downward sloping        | Downward sloping         |
| <b>Price and marginal cost</b> | $MC = P$                       | $MC < P$                | $MC < P$                 |
| <b>Long-run profit</b>         | Normal                         | Yes                     | Normal                   |





Firms operating in monopolistically competitive environments typically try to differentiate their products from those of their rivals. The more consumers think of a product as being distinctive or unique, the less elastic the demand for the product and the more ability the firm has to raise its price without losing customers. In this photo, we see that Apple is using a highly visible building façade to advertise its iPod.

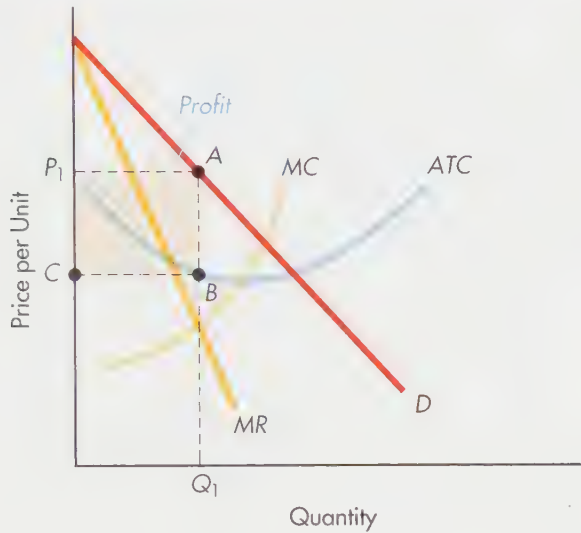
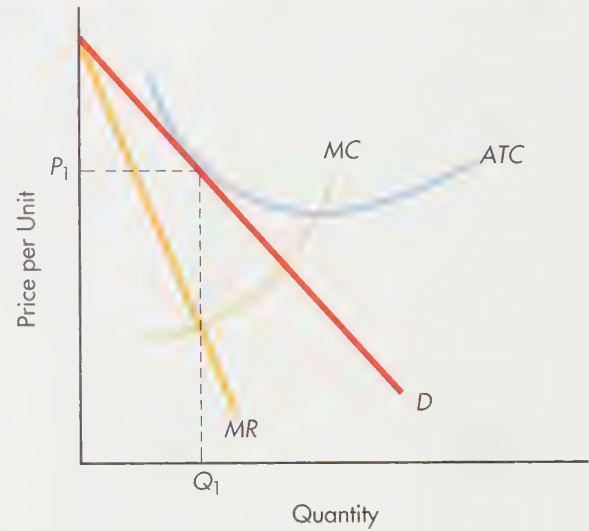
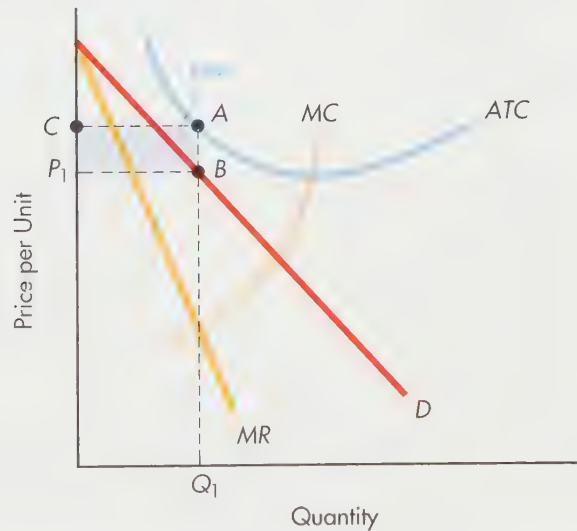
*Monopolistically competitive firms produce differentiated products.*

total market may not be expanding, they divide the market into smaller and smaller segments by introducing variations of products. You can think of a market demand curve for clothes, but within that market there are many niches and many demand curves. In fact, there is a separate demand curve for each firm and for each product the firm sells. Each individual demand curve is quite price elastic because of the existence of many close substitutes.

**1.a.1. In the Short Run** Figure 1(a) shows the cost and revenue curves of a monopolistically competitive firm providing a single product in the short run. As with all profit-maximizing firms, production occurs at the quantity where  $MR = MC$ . The price the firm charges,  $P_1$ , is given by the demand curve at the quantity where  $MR = MC$ . Price  $P_1$  is above average total cost, as indicated by the distance  $AB$ . Thus, the firm is earning above-normal profit, shown as the rectangle  $CBAP_1$ .

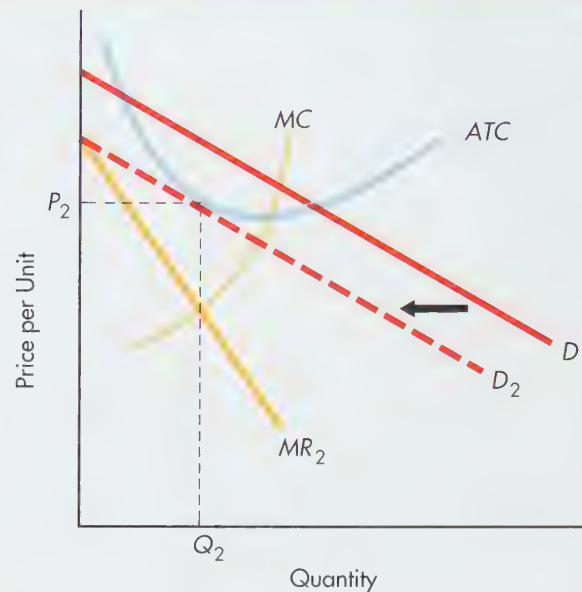
In Figure 1(b), the firms in a monopolistically competitive market are earning normal profit. The price is the same as the average total cost at  $Q_1$ , so a normal profit is obtained. If the firm is earning a loss, then the average-total-cost curve lies above the demand curve at the quantity produced, as shown in Figure 1(c). At  $Q_1$ , the firm is earning a loss, the rectangle  $P_1BAC$ . The firm must decide whether to temporarily suspend production of that product or to continue producing it because the outlook is favorable. The decision depends on whether revenue exceeds variable costs.

**1.a.2. In the Long Run** Whenever existing firms in a market structure without barriers to entry are earning above-normal profit, new firms enter the business and, in some cases, existing firms expand until all firms are earning the normal profit. In a perfectly competitive industry, the new firms supply a product that is identical to the product being supplied by existing firms. *In a monopolistically competitive industry, entering firms produce a close substitute, not an identical or standardized product.*

**FIGURE 1** A Monopolistically Competitive Firm**(a) Above-Normal Profit****(b) Normal Profit****(c) Economic Loss**

A monopolistically competitive firm faces a downward-sloping demand curve. The firm in Figure 1(a) maximizes profit by producing  $Q_1$ , where  $MR = MC$ , and charging a price,  $P_1$ , given by the demand curve above  $Q_1$ . Profit is the rectangle  $CBAP_1$ . In Figure 1(b), the firm is earning a normal profit because where  $MR = MC$ , price is  $P_1$  on the demand curve above  $Q_1$  and is equal to average total cost. In Figure 1(c), the firm is earning the loss of rectangle  $P_1BAC$ . At the profit-maximizing (loss-minimizing) output level,  $Q_1$ , average total cost exceeds price.

As the introduction of new products by new or existing firms occurs, the demand curves for existing products shift in until a normal profit is earned. For each firm and each product, the demand curve shifts in, as shown in Figure 2, until it just touches the average-total-cost curve at the price charged and the output produced,  $P_2$  and  $Q_2$ . When profit is at the normal level, expansion and entry cease.

**FIGURE 2** Entry and Normal Profit

In the long run, the firm in monopolistic competition earns a normal profit. Entry shifts the firm's demand curve in from  $D_1$  to  $D_2$ . Entry, which takes the form of a differentiated product, continues to occur as long as above-normal profits exist. When the demand curve just touches the average-total-cost curve, as at  $P_2$  and  $Q_2$ , profit is at the normal level.

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When a firm is earning a loss on a product and the long-run outlook is for continued losses, the firm will stop producing that product. Exit means that fewer differentiated products are produced, and the demand curves for the remaining products shift out. This continues until the remaining firms are earning normal profits.

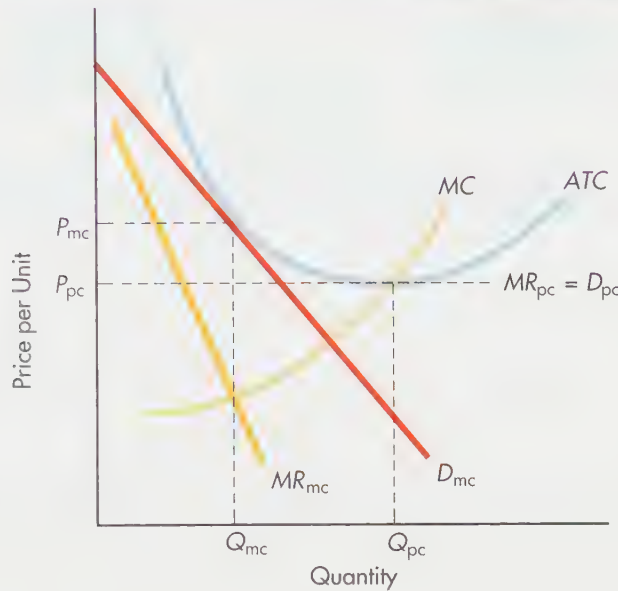
### 1.b. Monopolistic Competition versus Perfect Competition

Figure 3 shows both a perfectly competitive firm in long-run equilibrium and a monopolistically competitive firm in long-run equilibrium. The perfectly competitive firm, shown as the horizontal demand and marginal-revenue curve,  $MR_{pc} = D_{pc}$ , produces at the minimum point of the long-run average-total-cost curve at  $Q_{pc}$ ; the price, marginal cost, marginal revenue, and average total cost are  $P_{pc}$ . The long-run equilibrium for a monopolistically competitive firm is shown by the demand curve  $D_{mc}$  and the marginal-revenue curve  $MR_{mc}$ . The monopolistically competitive firm produces at  $Q_{mc}$ , where  $MR_{mc} = MC$ , and charges a price determined by drawing a vertical line up from the point where  $MR_{mc} = MC$  to the demand curve. That price is just equal to the point where the long-run average-total-cost curve touches the demand curve,  $P_{mc}$ . In other words, at  $Q_{mc}$ , the monopolistically competitive firm is just earning the normal profit.

The difference between a perfectly competitive firm and a monopolistically competitive firm is clear in Figure 3. Because of the downward-sloping demand curve facing the monopolistically competitive firm, the firm does not produce at the minimum point of the long-run average-total-cost curve,  $Q_{pc}$ . Instead, it produces a smaller quantity of output,  $Q_{mc}$ , at a higher price,  $P_{mc}$ . The difference between  $P_{mc}$  and  $P_{pc}$  is the

*Monopolistically competitive firms produce less and charge a higher price than perfectly competitive firms. Monopolistic competition does not yield economic efficiency because consumers are willing and able to pay for variety.*



**FIGURE 3** Perfect and Monopolistic Competition Compared

The perfectly competitive firm produces at the point where the price line, the horizontal  $MR$  curve, intersects the  $MC$  curve. This is the bottom of the  $ATC$  curve in the long run, quantity  $Q_{pc}$  at price  $P_{pc}$ . The monopolistically competitive firm also produces where  $MR = MC$ . The downward-sloping demand curve faced by the monopolistically competitive firm means that the quantity produced,  $Q_{mc}$ , is less than the quantity produced by the perfectly competitive firm,  $Q_{pc}$ . The price charged by the monopolistically competitive firm is also higher than that charged by the perfectly competitive firm,  $P_{mc}$  versus  $P_{pc}$ . In both cases, however, the firms earn only a normal profit.

additional amount that consumers pay for the privilege of having differentiated products. If consumers placed no value on product choice—if they desired generic products—they would not pay anything extra for product differentiation, and the monopolistically competitive firm would not exist.

Even though price does not equal marginal cost and the monopolistically competitive firm does not operate at the minimum point of the average-total-cost curve, the firm does earn normal profit in the long run. And although the monopolistically competitive firm does not strictly meet the conditions of economic efficiency (since price is not equal to marginal cost), the inefficiency is not due to the firm's ability to restrict quantity and increase price but instead is a direct result of consumers' desire for variety. It is hard to argue that society is worse off with monopolistic competition than it is with perfect competition, since the difference is due solely to consumer desires. Yet variety is costly, and critics of market economies argue that the cost is not worthwhile. Would the world be a better place if we had a simpler array of products to choose from, if there was a simple generic product—one type of automobile, say—for everyone?

### 1.c. Nonprice Competition—Product Differentiation

A firm in a monopolistically competitive market structure attempts to differentiate its product or itself from its competitors. Successful product differentiation reduces the price elasticity of demand. The demand curve, shown as the rotation from  $D_1$  to  $D_2$  in Figure 4, becomes steeper.



- 2** What behavior is most common in monopolistic competition?

**FIGURE 4** Advertising, Prices, and Profits

A successful differentiation program will reduce the price elasticity of demand, shown as a steeper demand curve,  $D_2$ , as compared with  $D_1$ . The successful differentiation enables the firm to charge a higher price.

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Numerous characteristics may serve to differentiate products: quality, color, style, safety features, taste, packaging, purchasing terms, warranties, and guarantees. All it takes is for the consumer to think there is a difference for there to be a difference. A firm might change its hours of operation—for example, a supermarket might offer service 24 hours a day—to call attention to itself. Firms can also use location to differentiate their products. A firm may locate where traffic is heavy and the cost to the consumer of making a trip to the firm is minimal. If location is used for differentiation, however, why do fast-food restaurants tend to be clustered together? Where you find a McDonald's, you usually find a Taco Bell or a Wendy's nearby. The model of monopolistic competition explains this behavior. Suppose that five identical consumers—A, B, C, D, and E—are spread out along a line as shown in Figure 5. Consumer C is the median consumer, residing equidistantly from consumers B and D and equidistantly from consumers A and E. Assume that the five consumers care about the costs incurred in getting to a fast-food restaurant and are indifferent about the food offered. McDonald's is the first fast-food provider to open near these five consumers. Where does it locate? It locates as close to consumer C as possible because that location minimizes the total distance of all five consumers from McDonald's.

Taco Bell wants to open in the same area. If it locates near consumer D, it will pull customers D and E from McDonald's but will have no chance to attract A, B, or C. Similarly, if it locates near consumer A, only A will go to Taco Bell. Only if Taco Bell locates next door to McDonald's will it have a chance to gather a larger market share than McDonald's. As other fast-food firms enter, they too will locate close to McDonald's.

Being able to earn positive economic profits is what drives firms to differentiate their goods and services. Every firm—producer, fabricator, seller, broker, agent, or merchant—tries to distinguish its offering from all others. The reason that firms try to differentiate themselves or their products is to make it more difficult for competitors to take away business.

Successful differentiation reduces the price elasticity of demand and gives the firm more market power. What does this mean for a firm? It means that the firm can raise the price of the good or service that it sells without incurring the loss of revenue that would

**FIGURE 5** Location under Monopolistic Competition

Five consumers—A, B, C, D, and E—reside along a straight line. Consumer C is in the middle, equidistant from B and D and from A and E. McDonald's decides to locate a restaurant at the spot that is closest to all five consumers. This is the median position, where consumer C resides. Other fast-food firms locate nearby because any other location will increase the total distance of some consumers from the fast-food restaurant, thereby causing some consumers to go elsewhere.

result if the elasticity were higher. For years, Intel was able to charge more for its microchips than competitors could charge for essentially the same microchip. Intel was able to do that because of its successful campaign to differentiate itself—“Intel Inside.” Intel was able to shift the demand curve for its products out and make it more inelastic.

**1.c.1. Brand Name** Starbucks has created a powerful brand name. People know that a Starbucks store will provide an identical product, whether that Starbucks is in Seattle or Beijing. The Starbucks brand name provides value to consumers, so they are willing to pay a higher price for Starbucks products than for similar products without the Starbucks name. A brand name is valuable to a firm; it makes the demand less elastic and can enable the firm to earn higher profits. How is a brand name created, and why does it have value?

Most goods and services have many different attributes—look, feel, taste, sensation, reliability, performance, and so on. You learn about many products by trying them, but this learning may be costly. For example, you may go into a coffee shop and pay for a crummy cup of coffee that you throw away. Or perhaps you buy a new TV that you later find does not have the picture quality you hoped for. A brand name can provide reliability and save you from these costly mistakes.

If you see someone selling neckties from a table set up on the street corner, you have less confidence in that “firm” than you would have in the Nordstrom store across the street, so you might be willing to pay more for the same tie at Nordstrom than at the street vendor. The reason is at least partly that Nordstrom has devoted huge resources to that large building. You see many types of firms trying to assure customers of their reliability by locating in large buildings or beautiful offices or by spending lavishly on advertisements. For some products, a guarantee or warranty is an important signal that the product is of high quality.

Reliability is the important differentiator for some goods and services, such as Starbucks, McDonald's, and so on. But for customers to know that the product is reliable, they must first try the product. A firm may advertise that its product “tastes great” or “refreshes you.” Goods may be advertised by showing groups of people having fun on a beach or in the mountains—such as with Coors beer, for example. The goods may be placed in a setting of upper class or wealth—Grey Poupon being requested by a passenger in a limousine, for instance. These advertisements are intended to get people to try the good or service.



Reliability may be represented by the consistent flavor of a McDonald's hamburger, the infrequency with which a machine breaks down, or the soundness of the opinions of a professional adviser. The consumer has to experience these products and services over a relatively long period of time before reliability is established. Once a consumer has had a positive experience with a good, the price elasticity of demand for that good typically decreases—the consumer becomes loyal to the product. For instance, Coke and Pepsi drinkers are usually loyal to one of the two brands, even though the products are similar. Prudential Insurance shows “the rock” and Allstate shows the “good hands” to illustrate their reliability. Although these symbols have nothing to do with the actual service, they promote an aspect of the service that consumers find valuable—the idea that the service will continue to be offered in the future, so that an experience now can be used to evaluate the service in the future. Lawyers and financial advisers need to present an image of success. Who wants to use an unsuccessful attorney or financial adviser? Thus, attorneys and financial advisers typically have richly appointed offices located in large central-city buildings. They dress in expensive clothes and carry expensive briefcases.

Many people claim that marketing and advertising create phony or artificial distinctions among products and that the benefits conferred by brand names are illusory. These critics note that there may be no difference between Tide laundry detergent and the generic detergent sold under the grocery store's label, that Ralph Lauren's Polo brand shirts may be constructed of exactly the same fabric and knit design as several less-expensive brands, and that aspirin is aspirin whether or not it is Bayer. Nonetheless, consumers are often willing to pay a higher price for a brand name product than for a similar product without a brand name. Why? Because the brand name signals something valuable—reliability, confidence, assurance.

The objective of creating a brand name is to reduce the price elasticity of demand. The greater the consumer's reluctance to shift brands, the lower the price elasticity of demand. Consumers who are loyal to a brand or to a firm will purchase that brand or purchase from that firm even if the prices are above those of competing brands.

Because it takes a long time to establish a reputation and a brand name, some firms attempt to rent a reputation that has been established in one market and use it in a new market. Endorsement of products by famous personalities is a clear example. Everyone knows that when celebrities endorse a product, it is not because the celebrities have scoured the market for the best product, but rather because they have canvassed potential sponsors to see who will offer the highest fee. So why are consumers influenced by the endorsement? Because the endorser is, to some degree, putting his or her reputation at risk. If the product is of low quality, the celebrity's reputation and value to other sponsors can be damaged. For the manufacturer, payment of the endorsement fee is a demonstration of its commitment to the market. Willingness to pay the endorsement fee is therefore actually a measure of product quality.

Firms will sometimes use their established reputation in one market to enter a new market. BMW's reputation for producing cars reinforces its reputation for producing motor bikes, and vice versa. BMW also endorses a range of “Active Line” sportswear. Caterpillar has a line of clothing, CAT, that portrays the image of its tough, no-nonsense equipment. There is little reason to believe that the capabilities that distinguish BMW cars or CAT equipment are applicable to the manufacture of clothes. But it would clearly be foolish for the companies to attach their name to poor-quality clothes.

Guarantees and warranties can also be ways to get people to experience a good or service. When Japanese automobile companies first entered the U.S. market in the 1960s, they faced the problem of convincing consumers of the quality of the cars. Although the manufacturers knew that their products were of high quality, their potential consumers did not. In fact, many potential consumers believed that Japanese goods were shoddy imitations of Western products. “Made in Japan” had become synonymous with cheap and

crummy. Accordingly, Japanese manufacturers offered more extensive warranties than had been usual in the market. Guarantees are difficult to fake. A low-quality product will break down frequently, making the guarantee quite costly for the firm. Thus, the higher the quality of the product, the better the guarantee that the firm can offer.

If a firm establishes a warranty policy, then other firms have to either follow or admit to having a lower-quality product. If another firm is unable to imitate its rivals' existing warranties, it may decide not to enter the market in the first place. This is what the Japanese auto producers did to the U.S. auto producers in the 1970s. U.S. auto producers did not offer as extensive warranties as the Japanese auto producers. As a result, customers soon came to see that "Made in Japan" meant quality. A similar strategy was employed in the late 1990s and early 2000s with respect to the Korean-manufactured Hyundai. Hyundai offered a 100,000-mile full warranty at a time when other manufacturers were offering 36,000-mile warranties.

The key aspect of firms in monopolistic competition is that they devote considerable resources to differentiating their goods and services. But since entry is easy, does that differentiation do the firm any good?

An innovation or successful differentiation in any area—style, quality, location, service—leads initially to above-normal profit, but it eventually brings in copycats that drive profit back down to the normal level. In a monopolistically competitive market structure, innovation and above-normal profit for one firm are followed by entry of other firms and normal profit. Differentiation and above-normal profit then occur again. They induce entry, which again drives profit back to the normal level. The cycle continues until product differentiation no longer brings above-normal profit.

Although an above-normal profit attracts competitors, even a short-lived period of above-normal profit is better than no positive economic profit. That is why firms in monopolistic competition devote so many resources to differentiating their products.

## RECAP

1. The market structure called *monopolistic competition* describes an industry in which many sellers produce a differentiated product and entry is easy.
2. In the short run, a firm in monopolistic competition can earn above-normal profit.
3. In the long run, a firm in a monopolistically competitive market structure will produce a lower output at a higher cost than a firm in a perfectly competitive market structure will. In both market structures, firms earn only a normal profit.
4. Monopolistic competitors may engage more in nonprice competition than in price differentiation.
5. The key aspect of monopolistic competition is differentiation.
6. As a firm successfully differentiates its product and earns a positive economic profit, other firms will mimic the successful firm and reduce the differentiation. As a result, the positive economic profit will be competed down toward a normal economic profit.

## 2. Oligopoly and Interdependence

In Mexico, only two or three companies provide goods and services in areas such as finance, telecommunications, broadcasting, and retailing. And in Poland, a candidate for finance minister argued that the country's current economic problems are due to the dominance of just one or a few firms in the fuel sectors and the financial markets. When a few firms dominate a market, an oligopoly is said to exist. *Oligopoly* is a market structure characterized by (1) few firms, (2) either standardized or differentiated products,



**3** What is oligopoly?

and (3) difficult entry. Oligopoly may take many forms. It may consist of one dominant firm coexisting with many smaller firms or a group of giant firms that dominate the industry. The characteristic that describes oligopoly is *interdependence*; an individual firm in an oligopoly does not decide what to do without considering what the other firms in the industry will do. When a large firm in an oligopoly changes its behavior, the demand curves of the other firms are affected significantly.

In perfectly competitive markets, what one firm does affects each of the other firms so slightly that each firm essentially ignores the others. Each firm in an oligopoly, however, must watch the actions of the other firms closely because the actions of one can dramatically affect the others. This interdependence among firms leads to actions not found in the other market structures.

## 2.a. The Creation of Oligopolies

In the chapter titled “Monopoly,” it was noted that a monopoly could, theoretically, arise as a result of natural barriers to entry such as economies of scale, actions on the part of firms that create barriers to entry, or governmentally created barriers. Oligopolies can arise for similar reasons. Many exist because of government regulations. The roots of Mexico’s oligopolies, for example, reach back to the 1950s and 1960s, when the government funded private businesses and closed the domestic market to international competition. During that era, the government created a culture in which the state supported companies—government officials forced mergers to create larger companies, and later helped their friends who headed those companies. Large companies owned by powerful dynasties such as the mining company Grupo Mexico, the transportation company TMM, and Bancomer, the country’s biggest bank, date from this period. Nowadays, this policy is known as “crony capitalism.” In Russia, crony capitalism dominated after the fall of the Soviet Empire. Former government officials, red directors, and oligarchs grabbed assets and took control of former state-owned enterprises such as mining, oil, and utilities.

It is not just developing nations whose governments create oligopolies. In Japan, businesses require government approval for many actions, including entering a new business. For instance, from the early 1990s through 2005, the government allowed only three phone companies—NTT DoCoMo Inc., KDDI Corp., and Vodafone KK—to offer services, although it is now widening the market to allow six new firms to enter the business. In the European Union, the large monopolies and oligopolies created by national governments must now restructure as union-wide companies.

Oligopoly can arise as the result of economies of scale. Since the cost per unit of output declines as a firm gets larger, only the larger firms can remain in business. A small business cannot offer goods and services at as low a price as a larger business can. Thus, the number of companies is determined by the size of the market—where the market-demand curve intersects the long-run average-total-cost curve. Whereas in a monopoly or a government-created oligopoly, competition may be very limited or nonexistent; in an oligopoly that is not supported by the government, the firms must constantly innovate and seek other barriers to entry. Cutthroat competition—competition through innovation, patents, and other means—is often the companion of oligopoly.

Walmart is the dominant retail firm in the United States and Microsoft is the dominant software company, but neither is the only firm in its industry. Both firms dominate because of the efficiencies they have experienced as they have grown and because of the strategies they undertake to maintain their dominance.



**4** In what form does rivalry occur in an oligopoly?

## 2.b. Oligopoly and Competition

Competition does not just mean that firms lower their prices. In the real world, we observe as much competition through innovation as we do through price. In computer



hardware and software, for example, firms race to see which will be the first to come out with a new product or which can obtain the patent on an innovation. Consumers are constantly being presented with upgrades and improvements to existing products as well as with brand-new products. Pharmaceutical companies race to create new drugs. They don't compete on price, but rather on innovation.

Firms earning economic profits must attempt to sustain the profit—to keep others from entering and eroding the profit. Firms looking to enter must figure out how best to do that, by lowering price, offering better quality, mimicry, or innovation. Strategy is the process of making decisions—choosing what to do and what to forgo. **Strategic behavior** occurs when what is best for A depends on what B does, and what is best for B depends on what A does. It is much like a card game—bridge, say—where strategies are designed depending on the cards the players are dealt. Underbidding, overbidding, bluffing, deceit, and other strategies are used. In fact, the analogy between games and firm behavior is so strong that economists and mathematicians developed the field of **game theory** to apply to strategic behavior. Game theory emerged in the 1940s and 1950s with the publication of *The Theory of Games and Economic Behavior* and the invention of the prisoners' dilemma.<sup>1</sup>

Oligopoly is the general market structure economists refer to when they mean that one firm's actions affect other firms and one firm is affected by the actions of others. So it seems a perfect fit for the use of game theory to describe the behavior of firms in an oligopoly. If one firm chooses to do something, what is to prevent others from doing the same or countering the direction of the first firm? Walmart created a competitive advantage with its inventory system that essentially reduced the ratio of cost of goods sold (COGS) to sales. The choice to focus on low prices followed from that competitive advantage. The strategy was dependent on what Walmart thought other firms could do. If Walmart executives had anticipated that a rival could immediately do the same thing, they might have selected a different strategy. But they expected to be able to enjoy economic profit for a few years before other firms caught up.

Managers of each firm must make decisions in the context of existing rivals and must even take into account the possible actions of potential rivals. There is no doubt that all managers are absorbed in their own firm's situations, but putting themselves in the shoes of competitors and focusing on the competitors' probable responses to actions they might undertake can be a useful exercise.

## 2.c. The Dilemma: Noncooperative Games

Consider the situation in which firms must decide whether to devote more resources to advertising. When a firm in any given industry advertises its product, its demand increases for two reasons. First, people who had not used that type of product before learn about it, and some will buy it. Second, other people who already consume a different brand of the same product may switch brands. The first effect boosts sales for the industry as a whole, whereas the second redistributes existing sales within the industry.

Assume that Figure 6 illustrates the possible actions that two firms might take and the results of those actions. The top left rectangle represents the payoffs, or results, if both A and B advertise; the bottom left is the payoffs when A advertises but B does not; the top right is the payoffs when B advertises but A does not; and the bottom right is the payoffs if neither advertises. If firm A can earn higher profits by advertising than by not advertising, whether or not firm B advertises, then firm A will surely advertise. This

### strategic behavior

The behavior that occurs when what is best for A depends on what B does, and what is best for B depends on what A does.

### game theory

A description of oligopolistic behavior as a series of strategic moves and counter moves.

<sup>1</sup> *Theory of Games and Economic Behavior*, by mathematician John von Neumann and economist Oskar Morgenstern, published in 1944 by Princeton University Press. In 1950, while addressing an audience of psychologists at Stanford University, A. W. Tucker created the prisoners' dilemma to illustrate the difficulty of analyzing certain kinds of games. His simple explanation has since given rise to a vast body of literature in subjects as diverse as philosophy, ethics, biology, sociology, political science, and economics.

FIGURE 6 Dilemma: Dominant Strategy Game

|        |               | Firm A                  |                         |
|--------|---------------|-------------------------|-------------------------|
|        |               | Advertise               | Not Advertise           |
| Firm B | Advertise     | Firm A 70<br>Firm B 80  | Firm A 40<br>Firm B 100 |
|        | Not Advertise | Firm A 100<br>Firm B 50 | Firm A 80<br>Firm B 90  |

Figure 6 illustrates the dominant strategy game. The dominant strategy for firm A is to advertise. No matter what firm B does, firm A is better off advertising. If firm B does not advertise, firm A earns 80 not advertising and 100 advertising. If firm B does advertise, firm A earns 40 not advertising and 70 advertising. Similarly, firm B is better off advertising no matter what firm A does. Both A and B have dominant strategies—advertise.

**dominant strategy**  
A strategy that produces better results no matter what strategy the opposing firm follows.

is referred to as a **dominant strategy**—a strategy that produces the best results no matter what strategy the opposing player follows.

Firm A compares the left side of the matrix to the right side and sees that it earns more by advertising, no matter what firm B does. If B advertises and A advertises, then A earns 70, but if B advertises and A does not advertise, it earns 40. If B does not advertise, then A earns 100 by advertising and only 80 by not advertising. The dominant strategy for firm A is to advertise. And according to Figure 6, the dominant strategy for firm B is also to advertise. Firm B will earn 80 by advertising and 50 by not advertising if A advertises, and will earn 100 by advertising but only 90 by not advertising if A does not advertise. But notice that both firms would be better off if neither advertised; firm A would earn 80 instead of 70, and firm B would earn 90 instead of 80. Yet the firms cannot afford to *not* advertise because they would lose more if the other firm advertised and they didn't. This situation is known as the prisoners' dilemma; see the Economic Insight "The Prisoners' Dilemma" for a more complete description of why it has this name.

This is exactly the situation cigarette producers were facing in the 1960s. None of the cigarette manufacturers wanted to do much advertising. Yet strategic behavior suggested that they must. Firm A advertises, so firm B must also do so. Each firm ups the advertising ante. How can this expensive advertising competition be controlled? Each firm alone has no incentive to do it, since unilateral action will mean a significant loss of market share. The two parties have fallen into a dilemma, something called a dominant strategy equilibrium. This remarkable result—that individually rational action results in both persons being made worse off in terms of their own self-interested purposes—is what has made the wide impact in modern social science. There are many interactions in the modern world that seem very much like this dominant strategy equilibrium: for example, arms races, road congestion, and the depletion of fisheries.

Let's consider a many-person version of this game. Assume people have two choices of transportation: cars or buses. The basic idea here is that car commuting increases congestion and slows down traffic. The more commuters drive their cars to work, the longer it takes to get to work, and the lower the payoffs are for both car commuters and bus commuters.

## ECONOMIC INSIGHT

### The Prisoners' Dilemma

Strategic behavior characterizes oligopoly. Perhaps the best-known example of strategic behavior occurs in what is called the prisoners' dilemma. Two people have been arrested for a crime, but the evidence against them is weak. The sheriff keeps the prisoners separated and offers each of them a special deal: If the prisoner confesses, that prisoner can go free as long as only he confesses, and the other prisoner will get ten or more years in prison. However, if both prisoners confess, each will receive a reduced sentence of two years in jail. The prisoners know that if neither confesses, they will be cleared of all but a minor charge and will serve only two days in jail. The problem is that they do not know what deal the other is being offered, or whether the other will take the deal.

The options available to the two prisoners are shown in the four cells of the figure. Prisoner B's options are shown

in the horizontal direction, and prisoner A's are shown in the vertical direction. In the upper left cell is the result if both prisoners confess. In the lower left cell is the result if prisoner A does not confess but prisoner B does; in the upper right cell is the result of prisoner A's confessing but prisoner B's not confessing; and in the lower right cell is the result when neither prisoner confesses. The dominant strategy for both prisoners is to confess and receive two years of jail time.

If the prisoners had been loyal to each other, each would have received a much smaller penalty. Because both chose to confess, each is worse off than he or she would have been if he or she had known what the other was doing. Yet in the context of the interdependence of the decisions, each made the best choice.

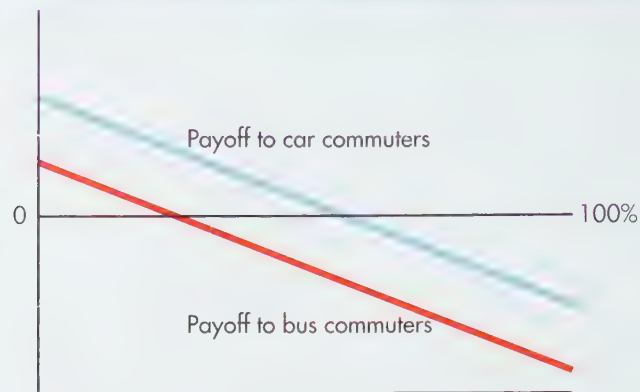
Prisoner B's Options

|                      | Confess  | Not Confess  |
|----------------------|--|--|
| Prisoner A's Options | <p>Prisoner A: 2 years</p> <p>Prisoner B: 2 years</p>  | <p>Prisoner A: Go free</p> <p>Prisoner B: 10 years</p> |
| Not Confess          | <p>Prisoner A: 10 years</p> <p>Prisoner B: Go free</p> | <p>Prisoner A: Go free</p> <p>Prisoner B: Go free</p>  |

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Figure 7 illustrates this. In the figure, the horizontal axis measures the proportion of commuters who drive their cars. Accordingly, the horizontal axis varies from a lower limit of zero to a maximum of 100 percent. The vertical axis shows the payoffs for this game. The upper (green) line shows the payoffs for car commuters. We see that it declines as the proportion of commuters in their cars increases. The lower (red) line shows the payoffs for bus commuters. We see that, regardless of the proportion of commuters in cars, cars have a higher payoff than buses. In other words, commuting by car



**FIGURE 7** Many-Person Prisoners' Dilemma

The horizontal axis measures the proportion of commuters who drive their cars, from zero to 100 percent. The vertical axis shows the payoffs for this game. The upper (blue) line shows the payoffs for car commuters. The lower (red) line is the payoff to bus commuters. The choice of the dominant strategies makes everyone worse off.

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is a dominant strategy in this game. In a dominant strategy equilibrium, all drive their cars. The result is that they all have negative payoffs, whereas, if all rode buses, all would have positive payoffs.

This is an extension of the prisoners' dilemma in that there is a dominant strategy equilibrium, and the choice of dominant strategies makes everyone worse off. To make the game a little more realistic, let us assume that some people do ride buses and that congestion does slow buses but slows cars even more.

Congestion slows the buses down, but because of a few special lanes for buses, the payoff for car commuters drops faster than for bus commuters. In Figure 8, when the proportion of people in their cars reaches  $q$ , the payoff for car commuters overtakes the payoff for bus riders, and for larger proportions of car commuters (to the right of  $q$ ), the payoff for commuting is worse than that for bus commuters.<sup>2</sup>

The game no longer has a dominant strategy equilibrium, but it has what is called a **Nash equilibrium**.<sup>3</sup> A Nash equilibrium occurs when a unilateral move by a participant does not make the participant better off. In Figure 8, starting from  $q$ , if one bus commuter shifts to commuting by car, that person moves into the region to the right of  $q$ , where car commuters are worse off, so the person who switched is worse off. On the other hand, starting from  $q$ , if one car commuter switches to the bus, that moves into the region to the left of  $q$ , where bus commuters are worse off, so, again, the switcher is worse off. No one can be better off individually by switching from  $q$ . When no one can move from the equilibrium and improve the outcome, the result is a Nash equilibrium.

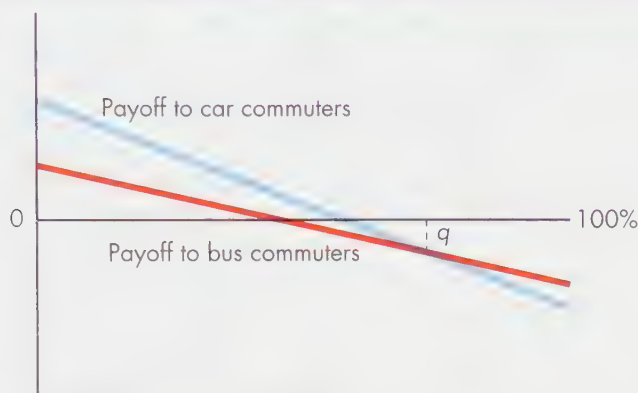
### Nash equilibrium

No player can be made better off by changing unilaterally.

**2.c.1. Repeated Games** Notice that in these games, the two parties interacted only once. Repetition of the interactions leads to quite different results. In fact, what occurred with the cigarette companies and their advertising dilemma is that the companies, along with consumers, lobbied to have the government pass a law banning cigarette advertising. A ban on cigarette advertising on television has been in effect since

<sup>2</sup> This example was provided by Roger McCain's *Game Theory: A Nontechnical Introduction to the Analysis of Strategy*, which is available at: <http://william-king.drexel.edu/top/eco/game/game.html>.

<sup>3</sup> Named after Nobel Laureate John Nash. Nash's life is featured in the movie *A Beautiful Mind*.

**FIGURE 8** Nash Equilibrium

Congestion slows the buses down, so that the payoff for bus commuters declines as congestion increases; but the payoff for car commuters declines even faster. When the proportion of people in their cars reaches  $q$ , the payoff for car commuters overtakes the payoff for bus riders, and for larger proportions of car commuters (to the right of  $q$ ), the payoff to for commuting is worse than that for bus commuters.

January 1, 1971. The ban was intended by the government as a means to reduce cigarette smoking—of helping the consumer. Yet who did this ban really benefit?

## 2.d. Cooperation

Notice that in these dilemma games there has been no communication between the parties. If they could communicate and commit themselves to coordinated strategies, a different outcome would result. Consider the decision to go with HD (high definition) or Blu-ray video technology.

Many households were holding off buying HD televisions and associated equipment because they were not sure which standard would prevail. Similarly, until February 2008, many manufacturers were debating whether to use HD or Blu-ray technology. Toshiba, the maker of HD, conceded defeat and left the market to Blu-ray. Suppose there are two firms considering whether to introduce new equipment but do not know which technology to use. This is represented in Table 2.

If each firm produces equipment using HD, each firm will earn profits of \$100. Similarly, if each firm produces equipment using Blu-ray, each firm will earn \$100. However, if the two firms produce equipment using different technologies, each firm will



**5** Why does cooperation among rivals occur most often in oligopolies?

**TABLE 2** The Cooperation Game

|        | Strategy | Firm B       |              |
|--------|----------|--------------|--------------|
|        |          | HD           | Blu-ray      |
| Firm A | HD       | \$100, \$100 | \$0, \$0     |
|        | Blu-ray  | \$0, \$0     | \$100, \$100 |

The two players are better off agreeing to a standard or a similar technology. Without that, the solution is the possibility of selecting a result that is not a Nash equilibrium.

earn zero. What will each firm do? If firm A thinks firm B will use HD, it should use HD as well. If firm A thinks firm B will use Blu-ray, firm A should do the same thing.

Although it looks a lot like the prisoners' dilemma at first glance, this is a more complicated game. The best strategy for each participant depends on the strategy chosen by the other participant; there are no dominant strategies. When there are no dominant strategies, the equilibrium is a Nash equilibrium. This game has two Nash equilibria; the firms do the same thing—both use HD or both use Blu-ray. How do they get to a Nash equilibrium? The firms might compete, they might communicate and agree to provide just one type of equipment, or they might lobby the government to create a standard for the protection of the consumer: Everyone must use HD or everyone must use Blu-ray. What actually occurred is that Sony (Blu-ray) was able to enlist more market participants than Toshiba (HD), including movie producers and studios.

The lack of communication in the prisoners' dilemma games is an artificial situation. The firms don't have to simply wait to see what the other does—they can sit down and talk it out. Acting jointly allows firms to earn more profits than they would if they acted independently or against each other. To avoid the destructiveness of strategic behavior, the few firms in an oligopoly may collude or come to some agreement about price and output levels. Typically these agreements provide the members of the oligopoly with higher profits and thus raise prices to consumers. A constraint facing firms is that it is illegal to collude. They cannot agree to fix prices or restrict competition. So how do they cooperate without breaking the law?

**2.d.1. Conventions** How do firms cooperate to avoid being in a prisoners' dilemma and also avoid colluding? Suppose you are talking on the telephone with a business associate and the connection is broken. Do you call your associate or do you wait for her to call you? If you call, you might get only a busy signal because she is also calling. If you wait, neither of you might call. What is best for you depends on what your associate does, and vice versa. There are two Nash equilibria to this problem. In one, you call and she does not; in the other, she calls and you do not. Even though there are two Nash equilibria, the problem is that without some rule of behavior, you may end up with a busy signal or no call. You could prevent this problem by announcing at the beginning of each phone conversation who will call if the connection is broken. Of course, this is very inefficient. No one wants to make such an announcement at the beginning of each call. What arises, then, is an efficient way to move toward the Nash equilibrium—called a **convention**. A typical convention is that the person who called originally calls again.

#### convention

An institution or procedure increasing efficiency.

**2.d.2. Price-Leadership Oligopoly** One way for firms to communicate without illegally colluding is to allow one firm to be the leader in changes in price or advertising activities. When the leader makes a change, the others duplicate what the leader has done. This enables all firms to know exactly what their rivals will do. It avoids the prisoners' dilemma situation where excessive expenditures are made on advertising or other activities. This type of oligopoly is called a *price-leadership oligopoly*.

The steel industry in the 1960s is an example of a dominant-firm price-leadership oligopoly. For many years, steel producers allowed U.S. Steel to set prices for the entire industry. The cooperation of the steel companies probably led to higher profits than would have occurred with rivalry. However, the absence of rivalry is said to be one reason for the decline of the steel industry in the United States. Price leadership removed the need for the steel companies to compete by maintaining and upgrading their equipment and materials and by developing new technologies. As a result, foreign firms that chose not to behave as price followers emerged as more sophisticated producers of steel than U.S. firms.



For many years, airlines also relied on a price leader. In many cases, the price leader was not the dominant airline, but instead was one of the weaker or new airlines. In recent years, however, airlines have communicated less through a price leader and more through their computerized reservation systems, according to the Justice Department.

**2.d.3. Cartels and Other Cooperative Mechanisms** A **cartel** is an organization of independent firms whose purpose is to control and limit production and maintain or increase prices and profits. A cartel can result from either formal or informal agreement among members. Like collusion, cartels are illegal in the United States. The cartel most people are familiar with is the Organization of Petroleum Exporting Countries (OPEC), a group of nations rather than a group of independent firms. During the 1970s, OPEC was able to coordinate oil production in such a way that it drove the market price of crude oil from \$1.10 a barrel to \$32 a barrel. For nearly eight years, each member of OPEC agreed to produce a certain, limited amount of crude oil as designated by the OPEC production committee. Then in the early 1980s, the cartel began to fall apart as individual members began to cheat on the agreement. Members began to produce more than their allocation in an attempt to increase profit. As each member of the cartel did this, the price of oil fell, reaching \$12 per barrel in 1988.

#### **cartel**

An organization of independent firms whose purpose is to control and limit production and maintain or increase prices and profits.

Production quotas for different firms or different nations are not easy to maintain. Most cartels do not last very long because their members cheat on the agreements. If each producer thinks that it can increase its own production, and thus its profits, without affecting what the other producers do, all producers end up producing more than their assigned amounts; the price of the product declines, and the cartel falls apart.

Economists have identified certain conditions that make it likely that a cartel will be stable. The conditions under which a cartel is likely to remain in force are as follows.

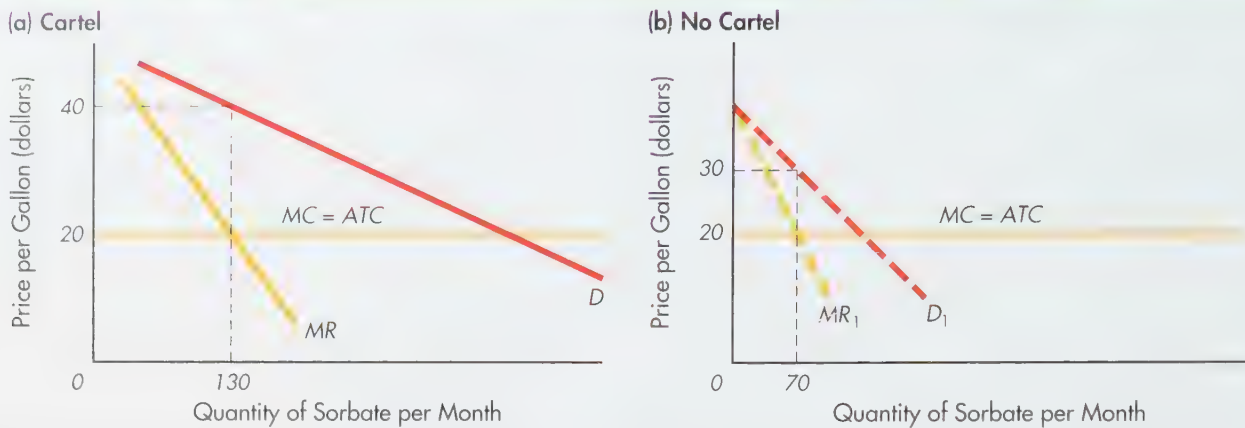
- There are few firms in the industry.
- There are significant barriers to entry.
- An identical product is produced.
- There are few opportunities to keep actions secret.
- There are no legal barriers to sharing agreements.

To illustrate, consider just two firms fixing prices. Figure 9 shows the market demand curve,  $D$ , with the simplifying assumption that marginal and average costs are constant. If the two firms were a monopolist rather than being two firms, the monopolist's marginal-revenue curve would be as shown in Figure 9(a), intersecting the marginal-cost curve at a quantity of 130 and a price of \$40. If the two companies act as one, they will select the monopoly price of \$40 and quantity of 130 and then split the market, with each having 65. The average cost is \$20, so each firm earns a profit of \$1,300 ( $\$20 \times 65$ ).

If instead the two firms compete with each other, then their demand curves will lie inside the market or monopoly demand curve. Figure 9(b) shows the demand and marginal revenue for firm 1. Firm 2 is identical to firm 1. As a result of competition, each firm sets a lower price and serves more customers. The profit each firm makes is \$700 ( $\$10 \times 70$ ). When the two firms compete, their combined profits are \$1,400; when they collude by fixing the price and setting the quantities each will produce, their profits are \$1,300 each, or \$2,600 combined.

The extra profits from collusion create an incentive for firms to cheat on their agreements. Suppose that one of the firms decides to sell more than its allotted quantity of 65. It will be able to sell the higher quantity only if the price is lower or if the other firm serves fewer customers. Either case hurts at least one of the colluding firms, and the cartel breaks apart.

Because there is a strong incentive for firms that are members of a cartel or that are colluding to cheat on their agreements, a way to stop cheaters, to penalize them, must

**FIGURE 9** Behavior of a Cartel

In Figure 9(a), the firms agree to act as a monopolist, setting the price where the monopolist would maximize profit and then sharing the resulting profits. When the cartel members act alone, as shown in Figure 9(b), they maximize profit by setting a lower price and selling to fewer customers than was the case when they acted as monopolists. The result is a lower profit.

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be found if the cartel is to remain in place. In most cartels, the strongest member takes over and polices it. In OPEC, it is Saudi Arabia that serves as police. When a member does not adhere to the prescribed quantity, Saudi Arabia opens its valves and floods the market with petroleum. Saudi Arabia can do this because it is the nation with the largest supply of petroleum. The flooded market means a lower price and thus lower profits for all countries. With the drug cartels of Colombia and Mexico, one family polices the agreement; cheaters typically end up dead. Without a policing authority, the cartel will fall apart.

Even though cartels are generally illegal in the United States, a few have been sanctioned by the government. The National Collegiate Athletic Association (NCAA) is a cartel of colleges and universities. It sets rules of behavior and enforces those rules through a governing board. Member schools are placed on probation or their programs are dismantled if they violate the agreement. The citrus cartel, composed of citrus growers in California and Arizona, enforces its actions through its governing board. Sunkist Growers Inc., a cooperative of many growers, represents more than half of the California and Arizona citrus producers and also plays an important role in enforcing the rules of the cartel. Major professional sports leagues are government-sanctioned cartels.

### facilitating practices

Actions by oligopolistic firms that can contribute to cooperation and collusion even though the firms do not formally agree to cooperate.

### cost-plus/markup pricing

A pricing policy whereby a firm computes its average cost of producing a product and then sets the price at some percentage above this cost.

**2.d.4. Facilitating Practices** Actions by firms can contribute to cooperation and collusion even though the firms do not formally agree to cooperate. Such actions are called **facilitating practices**. Pricing policies can give the impression that firms are explicitly fixing prices, or cooperating, when in fact they are merely following the same strategies. For instance, the use of **cost-plus/markup pricing** tends to lead to similar or identical pricing behavior among rival firms. If firms set prices by determining the average cost of an item and adding a fixed markup to the cost, they are engaging in cost-plus pricing. If all firms face the same cost curves, then all firms will set the same prices. If costs decrease, then all firms will lower prices the same amount and at virtually the same time. Such pricing behavior is common in the grocery business.

Another practice that leads to implicit cooperation is the most-favored-customer policy. Often, the time between purchase and delivery of a product is quite long. To

avoid the possibility that customer A purchases a product at one price and then learns that customer B purchased the product at a lower price or benefited from product features that were unavailable to customer A, a producer will guarantee that customer A will receive the lowest price and all features for a certain period of time. Customer A is thus a **most-favored customer (MFC)**.

The most favored-customer policy actually gives firms an incentive not to lower prices, even in the face of reduced demand. A firm that lowers the price of its product must then give rebates to all most-favored customers, which forces all other firms with most-favored-customer policies to do the same. In addition, the MFC policy allows a firm to collect information on what its rivals are doing. Customers will return products for a refund when another firm offers the same product for a lower price.

A most-favored-customer policy discourages price decreases because it requires producers to lower prices retroactively with rebates. If all rivals provide all buyers with most-favored-customer clauses, a high price is likely to be stabilized in the industry.

#### most-favored customer (MFC)

A customer who receives a guarantee of the lowest price and all product features for a certain period of time.

## RECAP

1. Oligopoly is a market structure in which there are so few firms that each must take into account what the others do, entry is difficult, and either undifferentiated or differentiated products are produced.
2. An oligopoly may come into being because government allows only a few firms to control or dominate an industry, or it may arise as a result of economies of scale.
3. Interdependence and strategic behavior characterize oligopoly.
4. The shape of the demand curve and the marginal-revenue curve facing an oligopolist depend on how rival firms react to changes in price and product.
5. The prisoners' dilemma is an example of how competition among firms that are interdependent can result in an outcome that is not the best for the competing firms.
6. Oligopolistic firms have incentives to cooperate. In a price-leadership oligopoly, one firm determines the price and quantity, knowing that all other firms will follow suit. The price leader is usually the dominant firm in the industry.
7. Collusion, or making a secret cooperative agreement, is illegal in the United States. Cartels, also illegal in the United States, rest on explicit cooperation achieved through formal agreement.
8. The incentive for cartel members to cheat typically leads to the collapse of the cartel. To minimize cheating, one member must police the others.
9. Facilitating practices implicitly encourage cooperation in an industry.

## 3. Summary of Market Structures

We have now discussed each of the four market structures in some detail. Table 3 summarizes the characteristics of each model and the main predictions yielded by that model. The model of perfect competition predicts that firms will produce at a point where price and marginal cost are the same (at the bottom of the average-total-cost curve) and profit will be zero in the long run. The model characterizes competition as an ideal—consumers get what they want at the lowest possible prices, and the efficiency for society is maximized. The model of monopoly predicts that price will exceed marginal cost and that the firm can earn positive economic profit in the long run. This model is the opposite of the ideal of perfect competition—the seller obtains the largest producer surplus and creates a deadweight loss. With monopolistic competition and oligopoly, we turn from the theoretical bookends of perfect competition and monopoly to



- 6 What are the differences and similarities among the four market structure models?



**TABLE 3** Summary of Perfect Competition, Monopoly, Monopolistic Competition, and Oligopoly

|                                | Perfect Competition            | Monopoly                | Monopolistic Competition | Oligopoly                       |
|--------------------------------|--------------------------------|-------------------------|--------------------------|---------------------------------|
| <b>Number of firms</b>         | Many                           | One                     | Many                     | Few                             |
| <b>Type of product</b>         | Identical                      | One                     | Differentiated           | Identical or differentiated     |
| <b>Entry conditions</b>        | Easy                           | Difficult or impossible | Easy                     | Difficult                       |
| <b>Demand curve</b>            | Horizontal (perfectly elastic) | Downward sloping        | Downward sloping         | Downward sloping                |
| <b>Price and marginal cost</b> | $MC = P$                       | $MC < P$                | $MC < P$                 | $MC < P$                        |
| <b>Long-run profit</b>         | Normal                         | Yes                     | Normal                   | Depends on whether entry occurs |

more real-life behaviors. With monopolistic competition, price will exceed marginal cost and the firm will not produce at the bottom point of the average-total-cost curve, but this is due to consumers' desire for product differentiation. In the long run, the firm in monopolistic competition will earn a normal profit. In oligopoly, a firm may be able to earn above-normal profit for a long time—as long as entry can be restricted. In oligopoly, price exceeds marginal cost, and the firm does not operate at the bottom of the average-total-cost curve.

Under perfect competition, consumers purchase products at the lowest possible price; there is no advertising, no excessive overhead, and no warranties or guarantees. Under monopoly, people purchase a single product and advertising is virtually nonexistent. With monopolistic competition and oligopoly, advertising commonly plays an important role.

## SUMMARY

### 1. What is monopolistic competition?

- Monopolistic competition is a market structure in which many firms are producing a slightly different product and entry is easy. §1
- Monopolistically competitive firms will earn a normal profit in the long run. §1.a.2

### 2. What behavior is most common in monopolistic competition?

- Entry occurs in monopolistically competitive industries through the introduction of a slightly different product. §1.a
- A monopolistically competitive firm will produce less output and charge a higher price than an identical perfectly competitive firm if demand and costs are assumed to be the same. §1.a

### 3. What is oligopoly?

- Oligopoly is a market structure in which a few large firms produce identical or slightly different

products and entry is difficult but not impossible. The firms are interdependent. §2

- Oligopolies may arise from government restrictions or from natural economic factors such as economies of scale. §2.a

### 4. In what form does rivalry occur in an oligopoly?

- Strategic behavior characterizes oligopoly. The firms are interdependent. The actions of each oligopolist will affect its competitors, and each will be affected by the actions of its rivals. §2.b
- Game theory is a description of behavior when players' decisions depend on the decisions of the other players. §2.b
- The prisoners' dilemma illustrates an outcome in which competition among interdependent firms results in an outcome that is less than the best for each firm. §2.c

- The prisoners' dilemma is a noncooperative game also called a dominant strategy game, one in which the parties select the dominant strategy. By doing so they do not select the best outcome for the parties as a whole. §2.c
- A dominant strategy is one a player will select no matter what strategy other players choose. §2.c
- Nash equilibrium is an equilibrium when unilateral action by one party will make the party worse off. §2.c

### 5. Why does cooperation among rivals occur most often in oligopolies?

- The small number of firms in an oligopoly and the interdependence of these firms creates the situation in which the firms are better off if they cooperate. §2.d
- Cooperation games indicate that by agreeing to a solution, the parties in a game will be better off than if they do not agree to a solution. §2.d
- Price leadership is another type of strategic behavior. One firm determines prices for the entire industry. All other firms follow the leader in increasing and decreasing prices. The dominant firm in the industry is most likely to be the price leader. §2.d.1
- Practices like collusion and cartels minimize profit, reduce rivalry, and ensure cooperation. §2.d.3

- Cartels are illegal in the United States and in many other nations but are acceptable in a few nations. §2.d.2, 2.d.3
- The incentive for members of a cartel to cheat on the other members often leads to a breakdown of the cartel. §2.d.3
- Cost-plus pricing ensures that firms with the same costs will charge the same prices. The most-favored-customer policy guarantees a customer that the price he or she paid for a product will not be lowered for another customer. Cost-plus pricing and the most-favored-customer policy are facilitating practices. §2.d.4

### 6. What are the differences and similarities among the four market structure models?

- Perfect competition and monopolistic competition involve many firms and easy entry and exit. Economic profit is zero in the long run. §3
- Monopoly means there is no entry and that competition will not drive profits to zero. §3
- Oligopoly refers to interdependence, or strategic behavior on the part of firms. Because entry is often difficult, an oligopolist can maintain profit until competition from entry does occur. If successful with cartels, collusion, or other practices of cooperation, the oligopolies may be able to maintain above-normal profits for a long period of time. §3

## KEY TERMS

cartel, 237  
 convention, 236  
 cost-plus/markup pricing, 238  
 dominant strategy, 232

facilitating practices, 238  
 game theory, 231  
 most-favored customer  
 (MFC), 239

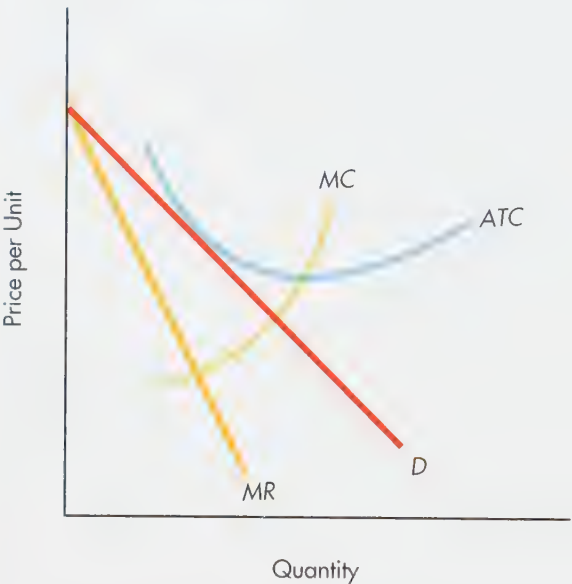
nash equilibrium, 234  
 strategic behavior, 231

## EXERCISES

1. Disney, Universal, and MGM, among others, have movie studios in Hollywood. Each of these major studios also has one or several subsidiary studios. Disney, for example, has Touchstone. What market structure best describes these movie production companies? Why would each studio have subsidiary studios? Consider the movies that have come out under the Disney name and those that have come out under Touchstone. Are they different?
2. Suppose that Disney was experiencing above-normal profits. If Disney is a member of a monopolistically competitive industry, what would you predict would happen to the demand curve for Disney movies over time? Suppose that Disney is a member of an oligopoly. How would this change your answer?
3. Why is monopolistic competition said to be inefficient? Suppose that you counted the higher price the consumer pays for the monopolistically

competitive firm's product as part of consumer surplus. Would that change the conclusion regarding the efficiency of monopolistic competition?

- 4. Why might some people claim that the breakfast cereal industry is monopolistically competitive but that the automobile industry is an oligopoly? In both cases, about eight to ten firms dominate the industry.
- 5. The graph that follows shows an individual firm in long-run equilibrium. In which market structure is this firm operating? Explain. Compare the long-run quantity and price to those of a perfectly competitive firm. What accounts for the difference? Is the equilibrium price greater than, equal to, or less than marginal cost? Why or why not?



- 6. Explain what is meant by strategic behavior.
- 7. The NCAA is described as a cartel. In what way is it a cartel? What is the product being produced? How does the cartel stay together?
- 8. Almost every town has at least one funeral home, even if the number of deaths could not possibly keep the funeral home busy. What market structure does the funeral home industry best exemplify? Use the firm's demand and cost curves and long-run equilibrium position to explain the fact that the funeral home can handle more business than it has. (Hint: Is the firm operating at the bottom of the average-total-cost curve?)
- 9. What is the cost to a firm in an oligopoly that fails to take rivals' actions into account?

- 10. Suppose a firm in monopolistic competition has the demand schedule shown in the following table. Suppose the marginal cost is a constant \$70. How much will the firm produce? Is this a long-or short-run situation? If the firm is earning above-normal profit, what will happen to this demand schedule?

| Price | Quantity | Price | Quantity |
|-------|----------|-------|----------|
| \$100 | 1        | \$70  | 5        |
| \$ 95 | 2        | \$55  | 6        |
| \$ 88 | 3        | \$40  | 7        |
| \$ 80 | 4        | \$22  | 8        |

- 11. The cement industry is an example of an undifferentiated oligopoly. The automobile industry is a differentiated oligopoly. Which of these two is more likely to advertise? Why?
- 12. The South American cocaine industry consists of several "families" that obtain the raw material, refine it, and distribute it in the United States. There are only about three large families, but there are several small families. What market structure does the industry most closely resemble? What predictions based on the market structure models can be made about the cocaine business? How do you explain the lack of wars among the families?
- 13. Use the payoff matrix below for the following exercises. The payoff matrix indicates the profit outcome that corresponds to each firm's pricing strategy.

|                |      | Firm A's Price                                       |  |
|----------------|------|--|--|
|                |      | \$20   | \$15   |
| Firm B's Price | \$20 | Firm A earns \$40 profit<br>Firm B earns \$37 profit | Firm A earns \$35 profit<br>Firm B earns \$39 profit |
|                | \$15 | Firm A earns \$49 profit<br>Firm B earns \$30 profit | Firm A earns \$38 profit<br>Firm B earns \$35 profit |

- a. Firms A and B are members of an oligopoly. Explain the interdependence that exists in oligopolies using the payoff matrix facing the two firms.
- b. Assuming that the firms cooperate, what is the solution to the problem facing the firms?
- c. Given your answer to part (b), explain why cooperation would be mutually beneficial and then explain why one of the firms might cheat.



14. What is the purpose of a brand name? What would occur if any maker of aspirin could put a Bayer Aspirin label on its product?
15. Explain the difference between a dominant strategy and a Nash equilibrium.

16. Explain why repeated interactions tends to break down the solution of a prisoners' dilemma. Why does the dilemma go away?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

# MEXICAN AUTHORITIES WORK TO BREAK UP DRUG CARTEL

*Houston Chronicle*, September 3, 2005

**M**EXICO CITY—Federal authorities have charged 15 police officers from the violent border city of Nuevo Laredo with organized crime and kidnapping, alleging they worked for the Gulf Cartel, officials said Friday.

The federal Attorney General's Office said in a statement that witnesses linked to a rival drug organization, the Sinaloa Cartel, allege the officers abducted them and handed them over to the Zetas, the Gulf Cartel's army of enforcers.

The witnesses were part of a group of 44 people found bound and gagged in a Nuevo Laredo house raided by federal agents and soldiers in June, the Attorney General's Office said.

The Gulf Cartel, led by the imprisoned Osiel Cardenas, and

the Sinaloa Cartel, led by escaped convict Joaquin "Shorty" Guzman, are fighting a bloody turf war to control Nuevo Laredo and its billion-dollar drug-smuggling routes into Texas, investigators say. The Gulf Cartel, authorities allege, had a number of local policemen on its payroll.

"The police used their position as municipal officers to detain people they thought were linked to the Shorty Guzman organization," the Attorney General's Office said. "They gave (the detainees) to the Zetas, who tortured them and used them to get information, get a ransom, or kill them."

Since Jan. 1, drug-related violence has left more than 100 people dead, including 15 police officers, in Nuevo Laredo, a city of 500,000 across the Rio Grande

from Laredo. One of the victims, Police Chief Alejandro Dominguez, was gunned down just hours after taking office.

The 15 accused policemen were part of a group of 41 Nuevo Laredo officers arrested in June after a shootout with federal agents. The fate of the other 26 detained officers will be decided soon, authorities said.

President Vicente Fox has declared the "mother of all battles" against drug traffickers and has promised to crack down on any corrupt police officer working for the cartels.

Since Jan. 1, there have been more than 830 drug-related killings in Mexico, mostly in states near the U.S. border.

*IOAN GRILLO*

**Source:** Copyright 2005, Ioan Grillo.

**N**uevo Laredo is a battleground. Warring drug organizations there are fighting for control of the billion-dollar drug-smuggling routes into the United States. In recent years, the drug trade, once the province of Colombian drug families, has been taken over by Mexican cartels. In particular, the Gulf Cartel and the Sinaloa Cartel have taken over drug smuggling. But now the two cartels are battling with each other. Let's use the material of this chapter to consider some of the cartels' actions.

Let's begin with the fact that the two factions are battling. Wouldn't cooperation seem to be preferred by each of them? We can present the alternatives in the matrix below.

|             |              | Sinaloa         |                  |
|-------------|--------------|-----------------|------------------|
| Gulf        | Share Market | Share Market    | Take Market      |
|             |              | Sinaloa = \$75* | Sinaloa = \$150* |
|             |              | Gulf = \$75*    | Gulf = 0         |
| Take Market |              | Sinaloa = 0     | Sinaloa = \$50*  |
|             |              | Gulf = \$150*   | Gulf = \$50*     |

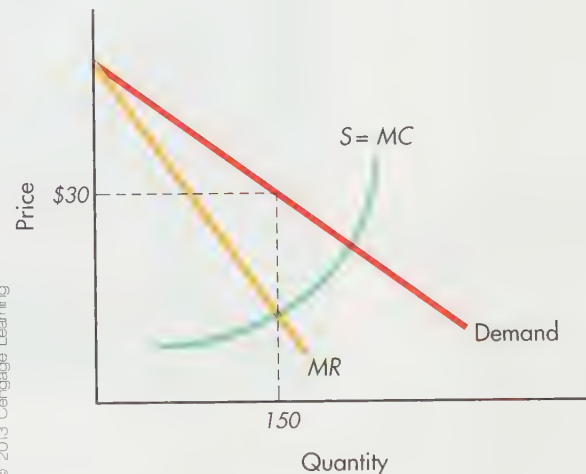
\*Amounts given are in hundreds of millions of dollars.

If the Sinaloa Cartel shares the market with the Gulf Cartel, each earns \$75 hundred million. If Sinaloa tries to take the market while Gulf tries to share, Sinaloa gets \$150 hundred million and Gulf gets nothing. Conversely, if Gulf tries to take the market while Sinaloa tries to share, Gulf gets \$150 hundred million and Sinaloa gets nothing. If both cartels try to take the market, then they both end up with \$50 hundred million, since the costs of battle take away from their profits. Notice from the matrix that the two will choose to fight—to take the market. Although each would be better off sharing the market than fighting for it, each has an incentive to try to take the market. This prisoners' dilemma points to the situation in which the two cartels find themselves.

The prisoners' dilemma points out that if the cartels could cooperate and share, they would be better off. We can show this on a standard demand and supply diagram as well. Consider the following diagram with the market-demand curve,  $D$ . If the cartels cooperated and acted as a single monopolist, they would have the marginal-revenue curve,  $MR$ , associated with demand,  $D$ , which would intersect the supply or  $MC$  at a quantity of 150 units and

a price of \$30. So by cooperating or colluding, the result would be greater profits for each—each must agree to sell 75 units at a price of \$30.

However, if they are colluding and have increased the price to \$30, the drug suppliers will each think to themselves, "Why don't I sell 100 units at a price of \$30?" The problem is that when the cartels begin selling more than their quota, the market price declines. The only way that the price can be kept high while one of the drug groups increases quantity is for the other group to reduce quantity. This means that one group gains while the other loses—something that neither group will accept. As a result, both groups begin selling more, and the price declines.



This is a common problem with cartels—the members have a huge incentive to cheat. Because there is a strong incentive for firms that are members of the drug cartel to cheat on agreements, a way to stop cheaters must be found, or else the cartel falls apart. In the illegal drug trade, cheaters are dealt with through violence and drug wars. When one drug cartel moves into the territory of another, drug wars break out. When one cartel expands its business without dealing with another cartel, violence erupts. According to the article, between January 1, 2005, and September 3, 2005, over 830 drug-related killings occurred in Mexico, and more than 100 people were killed in Nuevo Laredo.



# Antitrust, Regulation, and Public Finance

■ MACEJ FROLOW/GETTY IMAGES, INC



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## FUNDAMENTAL QUESTIONS

- 1 What is antitrust policy?
- 2 What is the difference between economic regulation and social regulation?
- 3 What international agencies regulate business behavior?
- 4 How does government pay for its activities?

**G**overnment is involved in the economy by the laws it makes and regulations it prescribes, by the taxes it imposes and the expenditures it makes. Those laws and regulations are enforced through a multitude of government agencies and departments. Table 1 provides a simple list of U.S. federal government agencies. There are a lot of agencies, but these numbers are only from the federal government. State and local governments also have many agencies and departments. In other words, government is a large player in the economy. In this chapter, we focus on government involvement in the private sector. We discuss government's policies toward business as well as government's role in defining rules and regulations for the private sector. We begin with a look at antitrust, the government's policies directed toward competition. We then turn to regulations—both those directed to business and those directed to the entire populace. Finally, we discuss how the government finances all its activities.

# 1. Antitrust

Antitrust means against trusts. Trusts are combinations of businesses that allegedly reduce competition. Thus **antitrust policy** prohibits agreements or practices that restrict free trade and competition among business entities. It also restricts abusive behavior by a firm dominating a market, or anticompetitive practices that tend to lead to such a dominant position. Antitrust enforcement at the U.S. federal government level takes place through the Department of Justice and the Federal Trade Commission, an “independent agency.”

**antitrust policy**  
Government policies and programs designed to control the growth of monopoly and enhance competition.

## 1.a. Antitrust Policy

Three laws define the U.S. government’s approach to antitrust—the Sherman, Clayton, and Federal Trade Commission Acts. You can see in Table 2 that the laws were enacted in the period between 1890 and 1914, a period in which the railroads, steel, oil, mining, and finance were becoming large and dominant businesses. The story at the time involved large, successful companies and their domination over smaller competitors—not too much unlike Microsoft and Walmart and their competitors today.



**1** What is antitrust policy?

## 1.b. Procedures

Any one of four different entities may sue a firm for alleged antitrust behavior: the U.S. Department of Justice, the Federal Trade Commission (FTC), state attorneys general,

**TABLE 1** A Simple List of the Numbers of U.S. Federal Government Departments and Agencies

| Department or Office                                | Number of Agencies |
|---|--------------------|
| Executive Office of the President                   | 22                 |
| Department of Agriculture                           | 18                 |
| Department of Commerce                              | 21                 |
| Department of Defense                               | 50                 |
| Department of Education                             | 43                 |
| Department of Energy                                | 37                 |
| Department of Health and Human Services             | 28                 |
| Department of Homeland Security                     | 14                 |
| Department of Housing and Urban Development         | 6                  |
| Department of the Interior                          | 9                  |
| Department of Justice                               | 45                 |
| Department of Labor                                 | 17                 |
| Department of State                                 | 37                 |
| Department of Transportation                        | 11                 |
| Department of the Treasury                          | 23                 |
| Department of Veterans Affairs                      | 4                  |
| Independent Agencies (under no specific department) | 61                 |
| Legislative Branch                                  | 9                  |
| Judicial Branch                                     | 10                 |

TABLE 2 Antitrust Acts

**Sherman Antitrust Act (1890)**

Section 1 outlaws contracts and conspiracies in restraint of trade.

Section 2 forbids monopolization and any attempts to monopolize.

**Clayton Antitrust Act (1914)**

Section 2, as amended by the Robinson-Patman Act (1936), bans price discrimination that substantially lessens competition or injures particular competitors.

Section 3 prohibits certain practices that might keep other firms from entering an industry or competing with an existing firm.

Section 7, as amended by the Celler-Kefauver Act (1950), outlaws mergers that substantially lessen competition.

**Federal Trade Commission Act (1914)**

Section 5, as amended by the Wheeler-Lea Act (1938), prohibits unfair methods of competition and unfair or deceptive acts.

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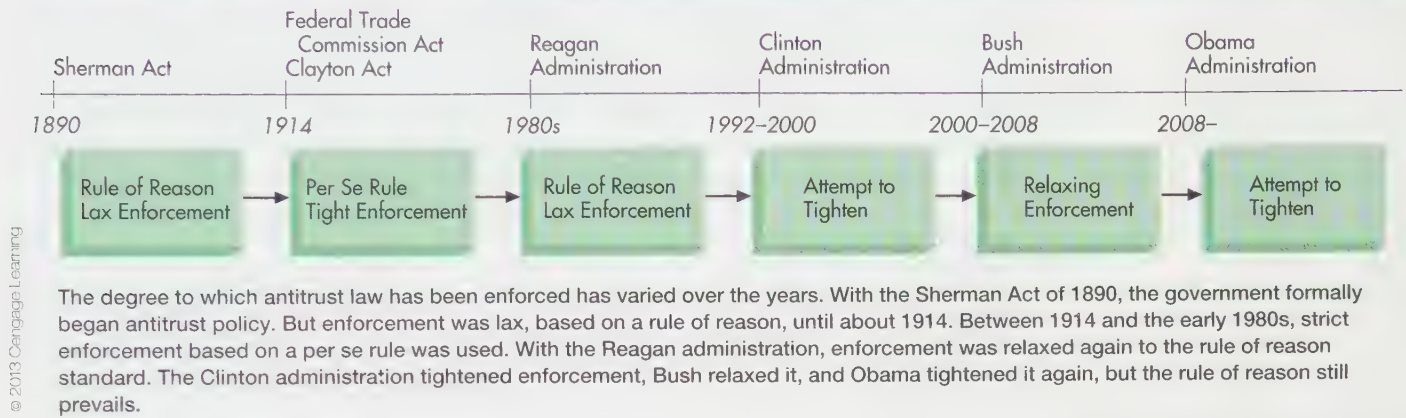
and private individuals or firms. Since 1941, the FTC and the Justice Department together have filed nearly 2,800 cases, but private suits have far outnumbered those filed by the Justice Department and the FTC combined. One reason is that if the private plaintiffs are able to win in court, they can receive compensation of up to three times the amount of the damages caused by the action. The Justice Department and the FTC do not obtain treble damages but can impose substantial penalties. They can force firms to break up through dissolution or divestiture, and the Justice Department can file criminal actions for violations of the Sherman Act. A guilty finding can result in fines and prison sentences.

1.c. Violations—Proof

Price fixing is by definition illegal—there is no justification for it. An executive of one firm can not call up an executive at a competitor and the two decide to set prices. Other aspects of the antitrust statutes are not as clear-cut and are, therefore, difficult to prove. For instance, Section 1 of the Sherman Act outlaws “every contract, combination ... or conspiracy” that is “in restraint of trade,” but it defines none of these terms. Similarly, Section 2 of the Sherman Act outlaws “monopolization” but does not forbid monopolies and does not define “to monopolize.” As a result of these ambiguities, the application of antitrust law has often depended on politics—the views of the judges appointed to the various courts, particularly the Supreme Court, and what party was in power—as much as or more than economics.

There have been several distinct phases of antitrust policy in the United States, as illustrated in Figure 1. The first began with passage of the Sherman Antitrust Act in 1890 and lasted until about 1914. In this period, litigation was infrequent. The courts used a *rule of reason* to judge firms’ actions: Being a monopoly or attempting to monopolize was not in itself illegal; to be illegal, an action had to be shown to have negative economic effects. The second phase of antitrust policy began in 1914 with the passage of the Clayton Antitrust Act and the Federal Trade Commission Act. Operating under these two acts, the courts used the *per se rule* to judge firms’ actions. Activities that were potentially monopolizing tactics were illegal; the mere existence of these activities was sufficient evidence to lead to a guilty verdict. The *per se* approach was strengthened during the 36 years that Justice William O. Douglas served on the Supreme Court.



**FIGURE 1** Phases of Antitrust Interpretation

Appointed by President Franklin Roosevelt in 1939, Douglas maintained a strong anti-trust stance until his departure from the Supreme Court in 1975. Following Douglas's departure, the court made a gradual move back to rule of reason. Justice Sandra Day O'Connor argued in 1984 that it was time to abandon the per se label and refocus the inquiry on the adverse economic effects and potential economic benefits. In general, this is how U.S. antitrust cases have been tried and decided since 1990. Nevertheless, the Democratic Clinton and Obama administrations have devoted more resources to anti-trust than did the Republican Bush administrations.

Antitrust cases are complex and often confusing. The typical approach is to demonstrate that a firm is a dominant firm and thus can raise or lower prices and quantities and carry out other practices at will. A dominant firm is one that has sufficient market share to be able to control prices and quantities. When a firm or a few firms are able to dictate the competitive conditions in a market, the market is called *concentrated*. Several ways to measure how concentrated a market is have been developed. The measure that is most relied on is called the *Herfindahl index* and is defined as the sum of the squared market shares of each firm in the industry:<sup>1</sup>

$$\text{Herfindahl index} = (S_1)^2 + (S_2)^2 + \cdots + (S_n)^2$$

where  $S$  refers to the market share of the firm, the subscripts refer to the firms, and there are  $n$  firms. The higher the Herfindahl index number, the more concentrated the industry.

A monopoly would have one firm with 100 percent of the market share, so the Herfindahl index would be  $(100)^2 = 10,000$ . An industry in which each of five firms has 20 percent of the market would have a Herfindahl index value of 2,000:

$$(20)^2 + (20)^2 + (20)^2 + (20)^2 + (20)^2 = 2,000$$

An industry in which there are five firms, but the largest firm has 88 percent of the market and each of the others has 3 percent, would have a Herfindahl index of 7,780:

$$(88)^2 + (3)^2 + (3)^2 + (3)^2 + (3)^2 = 7,780$$

<sup>1</sup> The four-firm concentration ratio is another commonly used measure of concentration, but it has come under criticism because it does not account for the size distribution of firms. It merely divides the total output of the four largest firms by the total market output.

The higher number indicates a much more concentrated market—an indication that one or a few firms dominate a market. The Justice Department defines its policies on the basis of the concentration measures. In 1982, 1984, and 1992, the Justice Department stated that industries with Herfindahl indexes below 1,000 are considered *highly competitive*; those with indexes between 1,000 and 1,800 are *moderately competitive*; and those with indexes above 1,800 are *highly concentrated*. The department was informing businesses that they needed to consider their impact on market share when they undertook actions; reducing competition could bring government lawsuits.

Using the Herfindahl index to gauge the extent to which a few firms dominate a market sounds simple, but it is not. Before the concentration of an industry can be calculated, there must be some definition of the market. In a \$100 billion market, an \$80 billion firm would have an 80 percent market share. But in a \$1,000 billion market, an \$80 billion firm would have only an 8 percent market share. The Herfindahl index in the former case would exceed 2,000, but in the latter case it would be less than 1,000. Obviously, those accusing a firm of attempting to monopolize a market would want the market defined narrowly, making it small. Conversely, those that are accused of monopolization would argue for broadly defined markets in order to give the appearance that they possess a very small market share.

For example, Coca-Cola, Dr Pepper, PepsiCo, and Seven-Up are usually identified as producers of carbonated soft drinks (CSD). These firms provide bottlers with the syrup that is used to make the drinks. Is this the appropriate market in which to assess the competitive consequences of the CSD behavior, or should the market be more widely defined—perhaps to encompass all potable liquids (fruit juices, milk, coffee, tea, etc.)?

In the Microsoft antitrust case, the Justice Department defined the market very narrowly. All of Microsoft's rivals were defined as not being in the same market—the market of single-user desktop PCs that run on an Intel chip. Thus, Apple's market share did not count because Apple ran on a Motorola chip. Nor did Sun Microsystems' share count because Sun was not Intel-based. Linux did not count because it came into being after the government's complaints against Microsoft. And the 15 percent of the PC market that consisted of machines offered without any operating system were not counted. Thus, the very narrow market as defined by the Justice Department led to a Herfindahl index of 10,000, whereas in a broader market, where Microsoft's market share was 65 percent or less, the Herfindahl index was about 5,000.

Defining the market and the degree of concentration is just the beginning. Perhaps the most difficult part of any antitrust lawsuit is establishing intent—did the firm intend the actions that it took to reduce competition? Did a firm set prices below costs in an attempt to run competitors out of business, or was it simply matching competitors' prices? Did a firm unfairly restrict access to customers by bundling products together or requiring exclusive deals with suppliers, or were these policies beneficial for the consumer? Did the combined efforts of companies benefit consumers, or were they attempts to create cartels? Questions like these are at the center of antitrust lawsuits.

### 1.d. Business Policy from a Global Perspective

A firm doing business in the United States must be wary of its actions once it gets large. The impact of its behavior on the Herfindahl index is carefully scrutinized when it wants to purchase other companies or merge with other firms. Moreover, the executives of the company must always be aware of how its actions might be viewed by the antitrust authorities. But if a business might be confused about what to do in the United States, consider a company that carries on business in many different nations. Each nation has a different set of laws. Approximately 70 jurisdictions have enacted merger review laws and merger notification regimes.

In an attempt to make the national antitrust laws more consistent with one another, the International Competition Network (ICN) was formed in October 2001. This is an informal network of antitrust agencies from developed and developing countries around the world. It began with antitrust officials from 14 jurisdictions—Australia, Canada, the European Union, France, Germany, Israel, Italy, Japan, Korea, Mexico, South America, the United Kingdom, the United States, and Zambia—but today, 90 member competition agencies from 80 jurisdictions participate. In addition to the ICN, the United States and the European Union have been attempting to encourage close cooperation between the agencies and to see the laws converge to become essentially the same. Right now, the laws are not the same and are applied in very different ways. Typically, the United States relies more on economic theory and the rule of reason approach (what the impact is), whereas the European Union relies more on the per se approach (guilty if it exists, without consideration of impact); it specifies particular actions as simply being prohibited irrespective of economic arguments. Other nations often attempt to simply be different from or more restrictive than the United States, not wanting to appear to be merely a puppet of U.S. antitrust authorities. Recently, more governments have been attacking cartels, using antitrust action to limit the actions of international cartels.

Microsoft illustrates the problems of globalization and national antitrust laws. The first antitrust case against Microsoft was filed in the United States in 1998 by the Justice Department and 20 state attorneys general as well as several private firms competing with Microsoft. The case was completed in 2002 with the finding that Microsoft had illegally maintained its Windows monopoly. Microsoft was required to allow PC makers and consumers to install competing products on their computers instead of the Internet Explorer browser and Media Player. Microsoft also had to reveal parts of its software code to other companies so that these companies could create products that would work with the Windows-based PCs.

The cases against Microsoft were far from over, however. In the European Union, EU regulators ruled that Microsoft had abused its near-monopoly in desktop computer systems to illegally dominate the media software market and threaten the position of competitors selling office networking software. It fined Microsoft and ordered it to both share code with rivals and offer an unbundled version of Windows without the Media Player software. In South Korea, antitrust regulators ruled that Microsoft had abused its market dominance, fined the company, and ordered it to offer alternative versions of Windows. Other countries have also looked at Microsoft from the perspective of their antitrust laws.

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## RECAP

1. Antitrust policy in the United States is based on the Sherman, Clayton, and Federal Trade Commission Acts.
  2. Antitrust lawsuits may be brought by private firms or individuals, the Justice Department, and the Federal Trade Commission. When a firm's actions are proven to be damaging to competition, the penalties imposed depend on who brought suit. If private concerns are involved, then penalties of up to three times the damages created by the actions may be imposed.
  3. The Herfindahl index is a measure of concentration, attempting to provide an indication of how one or a few firms might control a market. It is the sum of the squares of the market shares of the firms in an industry. The higher the number, the more concentrated the market.
  4. Currently, the United States tends to take a rule of reason approach, as do some other nations, but still others rely more on a per se rule.
-



**economic regulation**

The prescription of price and output for a specific industry.

**social regulation**

The prescription of health, safety, performance, and environmental standards that apply across several industries.



**2** What is the difference between economic regulation and social regulation?

## 2. Regulation

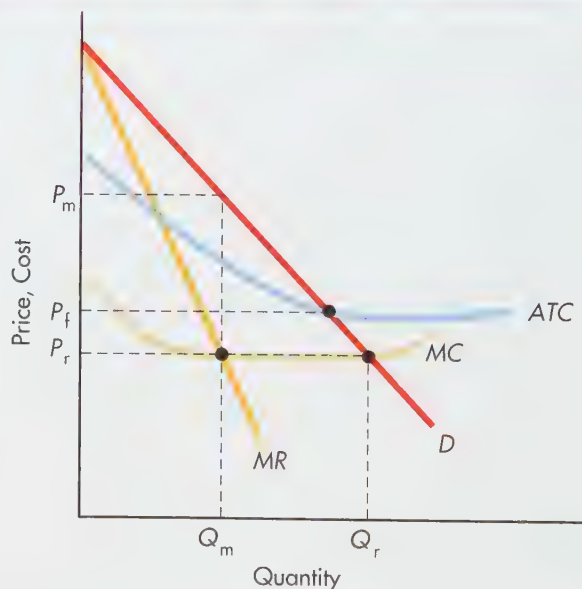
There are two categories of regulation: economic regulation and social regulation. **Economic regulation** refers to the prescribing of prices and output levels for entire industries. **Social regulation** refers to the prescribing of performance standards, workplace health and safety standards, emission levels, and a variety of output and job standards that apply across most if not all industries.

### 2.a. Economic Regulation

A natural monopoly exists when economies of scale make it efficient for a single firm to supply the entire market. Regulation of monopolies is based on the idea that certain industries—utilities, railroads, communication, and others—are natural monopolies. Most economic regulation of natural monopolies began during the Great Depression of the 1930s. The idea was to make the natural monopolist's price and supply much like what a perfectly competitive industry would provide.

Figure 2 shows the demand, marginal-revenue, long-run average-total-cost, and long-run marginal-cost curves for a natural monopoly. The huge economies of scale mean that it would be inefficient to have many small firms supply the product. Yet

**FIGURE 2** Natural Monopoly and Regulation



The demand, marginal-revenue, long-run average-total-cost, and marginal-cost curves for a natural monopoly are shown. The huge economies of scale mean that it would be inefficient to have many small firms supply the product. Yet producing at  $MR = MC$  and setting a price of  $P_m$  from the demand curve yields too small an output and too much profit for the firm, in comparison to the perfectly competitive result. Too few resources are devoted to this product—too few because if more were produced,  $MC$  would equal price. To achieve allocative efficiency (giving consumers the goods they most want), the regulatory agency must attempt to have the monopolist set a price equal to marginal cost. This price would be  $P_r$ . The monopolist would then produce at quantity  $Q_r$ . The problem with the regulated price  $P_r$  is that the revenues do not cover average costs. The fair-rate-of-return price is set to allow the monopolist a normal profit. The price corresponding to the normal profit is the one where demand and average total costs are equal,  $P_f$ .

allowing the natural monopoly to produce at  $MR = MC$  and set a price of  $P_m$  from the demand curve yields too little output and too much profit for the firm, in comparison to the perfectly competitive result. In addition, since price is greater than marginal cost, resources are not being allocated efficiently. In fact, too few resources are devoted to this product—too few because if  $MC$  were equal to price, more output would be produced. Can regulation solve this problem?

If the natural monopolist is to look like a perfectly competitive industry, then its price should be set equal to its marginal cost. At  $P_r$  in Figure 2,  $P = MC$ , and the monopolist would then produce at quantity  $Q_r$ . The problem with the regulated price  $P_r$  is that the regulated firm could actually make a loss. You can see in Figure 2 that demand lies below  $ATC$ , which means that revenues are less than total costs. Figure 2 illustrates a fairly common situation with public utility companies. Most public utilities acquire enough capacity to be able to provide the services needed during the *peak periods*. For instance, air conditioning is used most heavily during the 5 p.m. to 9 p.m. time period during the summer months. The demand during this period may be twice as great as the highest demand in any other time period. To be able to supply enough electricity for the peak period, the electric company has to have nearly double the generating capacity it would need in order to satisfy demand in other time periods. And this generating capacity simply sits idle most of the time. To avoid the problem of forcing utilities into bankruptcy, regulatory commissions allow for a **fair rate of return**. The fair-rate-of-return price is set to allow the monopolist a normal profit—that is, a zero economic profit. The price corresponding to the normal profit is one at which demand and average total cost curves intersect,  $P_f$ . Remember, a perfectly competitive firm in the long run would have price equal to marginal cost and equal to the minimum of the average total cost.

#### **fair rate of return**

A price that allows a monopoly firm to earn a normal profit.

The fair rate of return avoids driving a regulated firm into bankruptcy, but it creates a different problem. When the firm is allowed to set the price as a percentage of average costs, it has an incentive to increase costs. The regulated firm thus ends up with “too much” capital—it builds too much capacity or more office space than is needed because these capital costs can be included in the rate base.

## 2.b. Deregulation and Privatization in the United States

Regulation alters incentives and forces firms to change the way they do business. For instance, if firms are not allowed to compete using price, then they compete using other things. When airlines were unable to compete with prices, they competed instead with schedules, movies, food, and size of aircraft. The result was a much larger number of flights and expansion of aircraft capacity than was demanded by passengers. The load factor (the average percentage of seats filled) fell to less than 50 percent in the early 1970s.

Price competition among truckers was also stifled by regulation. The Interstate Commerce Commission (ICC) had a complex rate schedule and restrictions affecting whether trucks could be full or less than full and the routes that trucks could take. As a result, by the mid-1970s, 36 percent of all truck-miles were logged by empty trucks.

These problems and the higher costs that resulted finally led to a change. Trucking was deregulated in 1980 and air flight in 1982. Trucks were allowed to haul what they wanted, where they wanted, at rates set by the trucking companies. In air transportation, deregulation of route authority and fares was completed by 1982. But the government did not free up the airports and the air traffic control system. These remain government controlled and typically government owned. Much of the telecommunications industry was deregulated in 1984. Long-distance communication became free of restraint immediately, but local markets still retain some restrictions.

**stranded assets**

Assets acquired by a firm when it was regulated that have little value when the firm is deregulated.

**privatization**

Transferring a publicly owned enterprise to private ownership.

**contracting out**

The process of enlisting a private firm to provide a product or service for a government entity.

The deregulation of electricity generation and other utilities has not been uniform. Some states have lessened regulation more than others, but most continue to regulate utilities. Deregulation is a politically difficult thing to accomplish. The regulated companies argue that competition will cost too much because of their **stranded assets**. Electric and cable companies argue that if regulation is eliminated, they need to be compensated for the cable they have laid, the lines they have built, and the power plants they have created. Fair-rate-of-return regulation induced these companies to purchase a great deal of capital that they would not otherwise have purchased. The companies argue that they invested for the public good on the assumption that their monopolies would be preserved, and that to tell them that they aren't guaranteed a return on these assets is not right; exposing them to competition without compensating them for their previous investments amounts to an unconstitutional "taking" of their property.

**Privatization** is the term for changing from a government-run business to a privately owned and run business. Cities and local governments in the United States have **contracted out** (privatized) many services in recent years. Many local governments are now allowing private firms to provide garbage services, water services, and even road building and maintenance. Rural/Metro Company in Scottsdale, Arizona, has been running a private fire department for several decades. It is now purchasing contracts to run fire departments and emergency medical services throughout Arizona and in other states. Corrections Corporation of America in Nashville, Tennessee, is building prisons. Many members of Congress are looking at the U.S. Postal Service and arguing that private firms could deliver mail better and less expensively. Even highways are subjects for privatization. Arguing that the first good highways in the United States were privately built and operated in the late 1700s, some economists argue that congestion and air pollution today could be reduced if highways were privatized. And in a few locations, such as between Los Angeles and San Diego, highways have been privately built and maintained. As will be discussed in the chapter "Aging, Social Security, and Health Care," proposals for improving the Social Security system include privatization.

## 2.c. Social Regulation

Social regulation is concerned with the conditions under which goods and services are produced and the impact of these conditions on the public. Social regulation is often applied across all industries. For instance, the Environmental Protection Agency (EPA) enforces emission standards that apply to all businesses, and the Occupational Safety and Health Administration (OSHA) imposes workplace requirements on all businesses.

Who decides whether a regulation is necessary? How is the regulation to be implemented? According to economists, a cost-benefit calculation is necessary to determine whether a regulation should be implemented.

**2.c.1. Cost-Benefit Calculations** There have been several studies that focused on estimating the costs of regulations on the economy. These range from about \$400 billion to over \$800 billion, depending on what is included as a cost.<sup>2</sup> Who pays these costs? It may be the business, it may be the consumer, or both may end up paying, depending on the elasticities of demand and supply. The impact of social regulation on a business is illustrated in Figure 3. The firm is producing quantity  $Q_1$  at a cost of  $C_1$  and selling at a price of  $P_1$ . The firm, an automobile company, is told that it must increase the fuel efficiency of its fleet of cars. This requirement means that the company must modify its manufacturing plants and alter the parts it uses in its autos. The result is an increase in the company's fixed and variable costs, shown as an upward shift of the *ATC*

<sup>2</sup> Clyde Wayne Crews Jr., "Ten Thousand Commandments: An Annual Snapshot of the Federal Regulatory State," Cato Institute, 2003.



and  $MC$  curves. The regulation leads to less output being produced ( $Q_2$  rather than  $Q_1$ ) at higher costs ( $C_2$  rather than  $C_1$ ), and the output being sold at higher prices ( $P_2$  rather than  $P_1$ ). In virtually every case of regulation, consumers pay higher prices for the goods and services sold by the regulated firm. How much more does the consumer pay? The answer depends on the price elasticities of demand and supply.

If demand is inelastic, then the consumer will not be very likely to switch to a substitute good or service as the price rises. In such a case, the firm will be able to pass along a larger portion of the increased costs to the consumer in the form of higher prices than it will if demand is elastic, everything else the same. On the other hand, the firm is likely to have to bear a greater portion of the increased costs if supply is inelastic. An inelastic supply means that the firm is not able to easily switch its production and sales from the now more regulated and more costly good or service to a less regulated and less costly good or service.

Since both prices and costs are higher as a result of regulation, both producers and consumers lose benefits—consumer and producer surplus is reduced. Consider Figure 4(a), in which the demand and supply curves for the market for automobiles are illustrated. Consumer surplus is shown as triangle  $ABP_1$ , and producer surplus is shown as triangle  $ACP_1$ . Total societal surplus is thus the area outlined as  $ABC$ .

Autos pollute, and the cost of the pollution to society is shown as the area  $FGQ_1H$ . So suppose that a regulation is imposed on auto producers that requires them to produce cleaner-burning engines. The regulation causes the supply curve (the sum of the  $MC$  curves of each of the automobile firms) to shift up or in, as shown in Figure 4(b). This reduces consumer surplus to the area  $EBP_2$  and producer surplus to  $EJP_2$ . The area  $CAEJ$  is the cost of the regulation. What are the benefits? The benefits are the cost of the pollution that is no longer created by the automobiles. This is shown as the rectangle  $GIQ_2Q_1$ .

The cost–benefit calculation indicates whether a regulation benefits society or not. If the costs exceed the benefits, then, according to economic theory, the regulation should not be imposed. If a regulation is to be imposed, the amount or restrictiveness of the regulation should be at a level where marginal benefits equal marginal costs. Carrying out cost–benefit analyses on regulations is an approach that has been agreed to in principle by the U.S. federal government’s Office of Management and Budget and by the main financial agencies of most industrial countries.

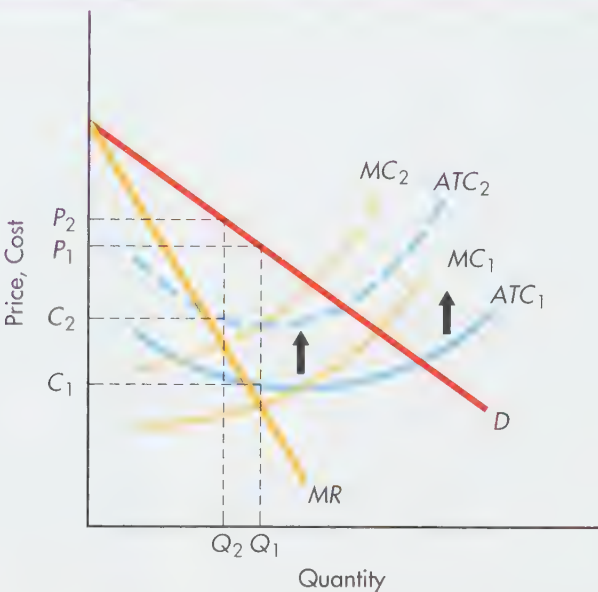
In many instances, the cost–benefit calculation is done in terms of lives saved and lives lost. For example, a program to detect and treat breast cancer among women over the age of 50 has been estimated to cost less than \$15,000 per life-year saved, whereas the cost per life-year saved of a regulation to reduce airborne exposure to benzene is approximately \$17.5 million. According to the federal government, the cost of some environmental regulations is high, as shown in Table 3.

Regulations may not be costly just in terms of dollars; they can also cost lives. The argument, according to economists, is that regulations are costly to implement and conform to, and so reduce income. When people are poorer, they spend less on health care and safety measures and engage in riskier behavior. For example, they buy smaller cars and visit the doctor less often. Hence, regulations that reduce people’s incomes can increase fatalities from other causes. A cost–benefit calculation for a regulation that is intended to save lives should compare the number of lives saved with the number of lives lost as a result of the regulation.



When a business is required to pay for environmental protection or cleanup, its costs of supplying goods and services rise. This can lead to higher prices for the consumer. Who pays the higher proportion of the costs, the consumers or the owners of the firm, depends on the price elasticities of demand for and supply of the firm’s goods and services. In this photo, a group is cleaning up after an oil tanker accident caused a 2.7-million-gallon spill on the shore of South Korea. You can see the black oil on the rocks.

**FIGURE 3** Regulatory Costs



The firm producing at  $Q_1$  with costs of  $C_1$  and selling at price  $P_1$  is required to implement changes in production in order to meet pollution requirements. The increased costs of the regulation are illustrated as upward shifts of the  $ATC$  and  $MC$  curves, leading to less output being produced ( $Q_2$  rather than  $Q_1$ ) at higher costs ( $C_2$  rather than  $C_1$ ) and thus being sold at higher prices ( $P_2$  rather than  $P_1$ ).

**FIGURE 4** Costs and Benefits of Regulation

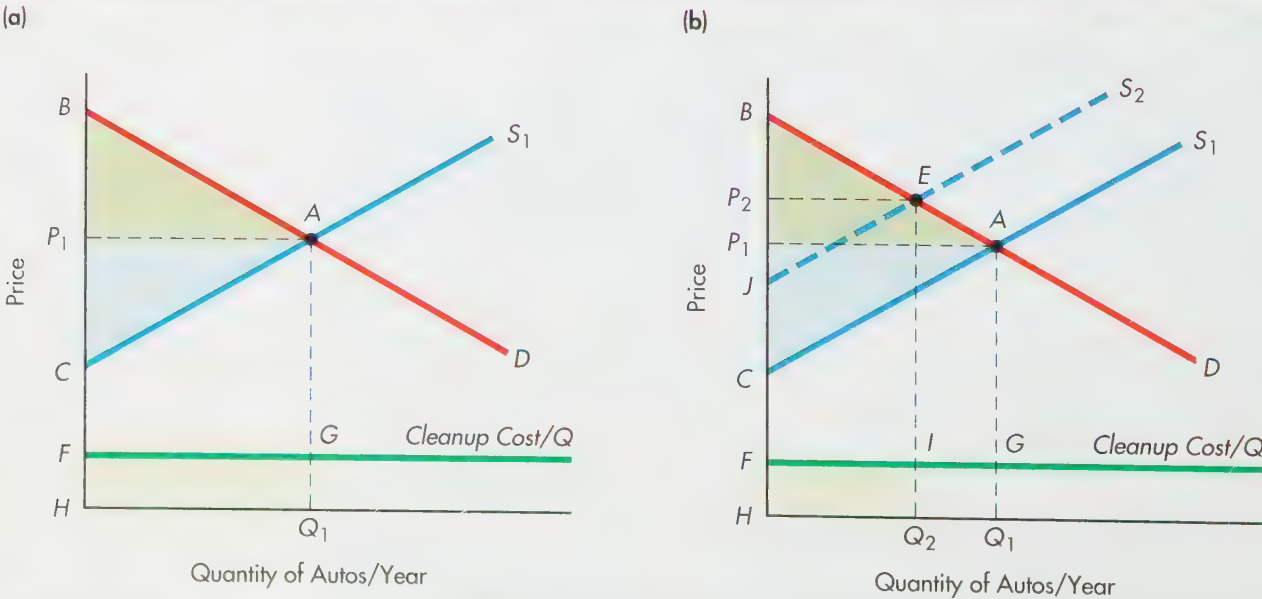


Figure 4(a) shows the market prior to regulation, and Figure 4(b) shows the effects of regulation. The regulation causes the supply curve (the sum of the  $MC$  curves of each of the automobile firms) to shift up. This reduces consumer surplus to the area  $EBP_2$  and producer surplus to  $EJP_2$ . The area  $CAEJ$  is the cost of the regulation. The benefits of the regulation are the costs of the pollution that is no longer created by the automobiles (area  $GICQ_2Q_1$ ).

**TABLE 3** The Cost of Regulation

| Regulation of                 | Saves           | At a Cost per Life of |
|-------------------------------|-----------------|-----------------------|
| Grain dust                    | 4.00 lives/year | \$5.3 million         |
| Uranium mines                 | 1.10 lives/year | 6.9 million           |
| Benzene                       | 3.80 lives/year | 17.1 million          |
| Glass plants                  | 0.11 life/year  | 19.2 million          |
| Ethylene oxide                | 2.80 lives/year | 25.6 million          |
| Copper smelters               | 0.06 life/year  | 26.5 million          |
| Uranium mill tailings, active | 2.10 lives/year | 53 million            |
| Low-arsenic copper            | 0.08 life/year  | 764 million           |
| Land disposal                 | 2.52 lives/year | 3,500 million         |
| Formaldehyde                  | 0.01 life/year  | 72,000 million        |

**Source:** U.S. Office of Management and Budget, Office of Information and Regulatory Affairs, *Report to Congress on the Costs and Benefits of Federal Regulations, 1998*. Each year the OMB provides cost-benefit calculations for rules implemented during the year; see [www.whitehouse.gov/omb](http://www.whitehouse.gov/omb).

Studies have shown that any regulation costing more than about \$8.4 million for each life saved is likely to cause overall fatalities to rise. Looking at the cost of regulations suggests that many do the opposite of their intended objective. Most of the Federal Aviation Administration's regulations cost less than \$8.4 million per life saved, and thus arguably yield a net saving of lives. The same is true for most of the National Highway Traffic Safety Administration's rules. The record of the Occupational Safety and Health Administration (OSHA) is not so good. OSHA regulations are about evenly divided between those that are cheap enough to save lives on balance and those (e.g., OSHA's ethylene dibromide and formaldehyde rules) that are so costly that they have no doubt killed far more people than would have died in the absence of the regulations. The Environmental Protection Agency's (EPA) regulations are almost all more costly in terms of lives lost than they are beneficial in terms of lives saved. The arsenic standard, for example, costs almost \$27 million per life saved, according to the official numbers. This income loss leads to about three added fatalities from other causes for each life saved. Similarly, the EPA asbestos standard was supposed to save 10 lives each year. However, its cost per life saved (about \$144 million) suggests that 18 people will die each year to save those 10.<sup>3</sup>

A cost-benefit test would limit regulations to those that create benefits greater than their cost. But as shown by the examples presented in Table 2, many regulations do not pass a cost-benefit test but are implemented anyway. Why? We will discuss this issue further in the next chapter, "Market Failure, Government Failure, and Rent Seeking."

## 2.d. Multinationals, International Regulation, GATT, and the WTO

International regulation occurs at two levels, one in which a specific government regulates the activities of individual firms operating within the country, and another in which several nations are involved. The General Agreement on Tariffs and Trade (GATT) is a



**3** What international agencies regulate business behavior?

<sup>3</sup> Ulf-G. Gerdtham and Magnus Johannesson, "Do Life-Saving Regulations Save Lives?" *Journal of Risk and Uncertainty*, Vol. 24, pp. 231–249, 2002. John F. Morrall III, "A Review of the Record," *Regulation*, November/December 1986, pp. 25–34. Daniel K. Benjamin, "Killing Us with Kindness," *PERC Reports*, Vol. 20, No. 3, September 2002, [perc.org](http://perc.org).



# ECONOMIC INSIGHT

## Economic Freedom

How big of a player is the government in the private sector in countries? The Heritage Foundation and *The Wall Street Journal* created the Index of Economic Freedom in 1994 and have published the index each year since, as a response to this question.<sup>4</sup> Economic freedom is the degree to which individuals are able to carry out voluntary transactions independent of government. "Individuals are economically free if they can fully control their own labor and property."<sup>5</sup>

According to the Index of Economic Freedom, the United States is not the freest economy in the world. In 2009, nations such as Australia, Ireland, New Zealand, and Singapore are rated as being economically freer than the United States. Hong Kong, being controlled by communist China, is rated as one of the most economically free areas in the world. What this means is that government is more involved in the economy in the United States than it is in these other nations. Higher taxes mean less economic freedom, more rules and regulations mean less economic freedom, restrictions on travel mean less economic freedom, restrictions on international trade mean less economic freedom, the paperwork necessary to comply with government rules and regulations means less economic freedom, and so on. The index is composed of 10 components:

1. *Business freedom* is the ability to create, operate, and close an enterprise quickly and easily. Burdensome, redundant regulatory rules are the most harmful barriers to business freedom.
2. *Trade freedom* is a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services.
3. *Fiscal freedom* is a measure of the burden of government from the revenue side. It includes both the tax burden in terms of the top tax rate on income (individual and corporate separately) and the overall amount of tax revenue as a portion of gross domestic product (GDP).
4. *Government size* is defined to include all government expenditures, including consumption and transfers.
5. *Monetary freedom* combines a measure of price stability with an assessment of price controls. Both inflation and price controls distort market activity.
6. *Investment freedom* is an assessment of the free flow of capital, especially foreign capital.
7. *Financial freedom* is a measure of banking security as well as independence from government control.
8. *Property rights* is an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state.

9. *Freedom from corruption* is based on quantitative data that assess the perception of corruption in the business environment.

**TABLE 4** The Ten Most Free Economies and Ten Least Free Economies

| RANK                            | COUNTRY                      | OVERALL |
|---------------------------------|------------------------------|---------|
| <b>Ten Most Free Economies</b>  |                              |         |
| 1                               | Hong Kong                    | 89.7    |
| 2                               | Singapore                    | 87.2    |
| 3                               | Australia                    | 82.5    |
| 4                               | New Zealand                  | 82.3    |
| 5                               | Switzerland                  | 81.9    |
| 6                               | Canada                       | 80.8    |
| 7                               | Ireland                      | 78.7    |
| 8                               | Denmark                      | 78.6    |
| 9                               | United States                | 77.8    |
| 10                              | Bahrain                      | 77.7    |
| <b>Ten Least Free Economies</b> |                              |         |
| 170                             | Timor-Leste                  | 42.8    |
| 171                             | Iran                         | 42.1    |
| 172                             | Democratic Republic of Congo | 40.7    |
| 173                             | Libya                        | 38.6    |
| 174                             | Burma                        | 37.8    |
| 175                             | Venezuela                    | 37.6    |
| 176                             | Eritrea                      | 36.7    |
| 177                             | Cuba                         | 27.7    |
| 178                             | Zimbabwe                     | 22.1    |
| 179                             | North Korea                  | 1.0     |

**Source:** Data adapted from the 2011 *Index of Economic Freedom*; <http://www.heritage.org/index/ranking.aspx>.

<sup>4</sup> The Fraser Institute introduced the Economic Freedom of the World Index a year earlier. The measures are very similar.

<sup>5</sup> The index is available at <http://www.heritage.org>. Methodology used in calculating the Index of Economic Freedom is available at [http://www.heritage.org/index/PDF/2011/Index2008\\_Chap4.pdf](http://www.heritage.org/index/PDF/2011/Index2008_Chap4.pdf).

10. *Labor freedom* is a measure of the ability of workers and businesses to interact without restriction by the state.

A measure of the amount of freedom in each component is calculated, and the components are equally weighted to create the index. The top 10 and bottom 10 nations in terms of economic freedom are listed in Table 4. Index values for each country are shown in page 258.

Economic freedom had generally increased until 2007. The economic recession that began in 2007 altered the

momentum toward economic freedom in most parts of the world. In North America and Europe, banks were nationalized, large companies were provided with government handouts, and economic regulations in financial and other sectors increased. (See the Economic Insight “U.S. History of Bailouts.”) Throughout Asia, Eastern Europe, and Latin America, governments increased spending and control over industries.

form of the latter. In April 1947, delegates from the United States, Asia, Europe, and Latin America traveled to Geneva, Switzerland. Aware of the effects of trade restrictions on economic health that had been experienced during the Great Depression, they all sought to liberalize trade, reduce barriers, and create an environment in which economies would prosper. The first global trade agreement resulted, called GATT. Today the successor to GATT is called the World Trade Organization (WTO). Its 149 member nations have agreed to settle trade disputes in the WTO courts rather than raise barriers, impose tariffs, or otherwise restrict trade. The WTO was created on January 1, 1995, by the Uruguay Round of the GATT. It is located in Geneva.

Although trade was increasingly globalized between 1990 and 2007, the recession beginning in 2007 led many governments to begin restricting trade. Bills introduced in the United States in 2009 included some restrictions to “buy American,” which required entities receiving government subsidies or government spending programs to ensure that they purchased resources from American suppliers. Other nations reacted to such restrictions by imposing tariffs and taxes on U.S. goods. Overall, trade was reduced as a result.

## RECAP

1. Economic regulation means that the government dictates the price that a firm may charge and/or the quantity that a firm must supply.
2. Economic regulation typically applies to an entire industry.
3. Since the mid-1970s, deregulation has occurred in airlines, trucking, railroads, and communications in the United States.
4. Social regulation deals with workplace safety, product safety, the environment, and other aspects of doing business; it applies to all industries. Social regulation accounts for most of the growth of regulations in the United States.
5. A cost-benefit calculation measures whether the benefits of a rule or regulation exceed the costs. Economists assert that only those regulations that create more benefits than costs should be implemented.
6. The costs of a rule or regulation include the reduction in output produced, higher costs of production, and higher prices. They also include the lost consumer and producer surplus. The benefits of the rule or regulation are the reductions in the costs of cleaning up wastes and reductions in the risk to human life.
7. In other countries, nationalization occurred instead of regulation. In those countries, deregulation means privatization, the transferring of ownership from the government to private individuals.
8. Attempts to increase trade among nations have led to the creation of GATT and then the WTO.

### 3. Public Finances

With antitrust and regulation, government has lots of activities. These and other government activities have expanded since the founding of the United States. In 1789 when the U.S. Constitution was adopted, there were only two departments that were specified as necessary, the State Department and the Defense Department. Today there are 15 departments. In addition, there are agencies that are not part of any department, but report directly to the Executive Office of the President. These include:

- Environmental Protection Agency (EPA)
- National Aeronautics and Space Administration (NASA)
- Office of Management and Budget (OMB)
- Office of National Drug Control Policy (ONDCP)
- Office of the United States Trade Representative (USTR)

The Constitution grants the president a very limited set of duties, including representing the United States in foreign affairs, commanding the armed forces, and nominating Supreme Court justices, executive officials, ambassadors, and other public officers. The Constitution and Bill of Rights enumerate the duties of Congress to be:

*to lay and collect Taxes, to pay the Debts and provide for the common Defence and general Welfare of the United States, to borrow money on the credit of the United States, to regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes, to declare war, to raise and support Armies, but not for any longer than two years, and to provide and maintain a Navy.*

U.S. Constitution, Article I, Section 8

As you can readily observe by simply looking around, these limited powers of the federal government bear no resemblance to government today. There is virtually nothing the government does not do and virtually nothing that many scholars claim the government can do. This means that spending by the government has risen over the years.



**4** How does government pay for its activities?

#### 3.a. Government Spending

In Figure 5, Government expenditures as a percentage of gross domestic product (GDP) is plotted. GDP is the total value of output produced in a country over one year; it is a measure of the size of the total economy. So if GDP is increasing, and the ratio of government expenditures to GDP is rising, then government expenditures are rising faster than the total value of output created each year. The spending shown in Figure 5 includes federal, state, and local levels of government.

Where does the government get the money to spend? The federal government can collect taxes and borrow; some state and local governments can also raise taxes and borrow while others can only collect taxes—they are required to have a balanced budget.

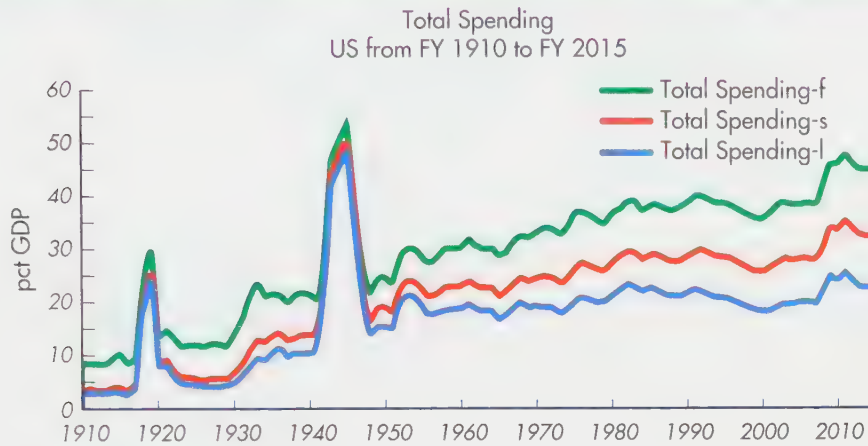
#### 3.b. Taxes

Most government spending is financed with tax revenues. Taxation in the United States includes payments to federal, state, and local governments as well as municipal, township, district, and county governments, and regional entities such as school, utility, and transit districts.

The federal government collects most of its revenue from individual income taxes, although the money collected from the payroll taxes is growing rapidly, as illustrated in Figure 6.

The current breakdown of federal revenues is shown in Figure 7. Figure 8 shows the growth of federal government revenues since 1965. The revenues have tripled over that time period even though federal government spending has increased even more.



**FIGURE 5** Total Government Spending as a Percent of GDP 1910 to 2015

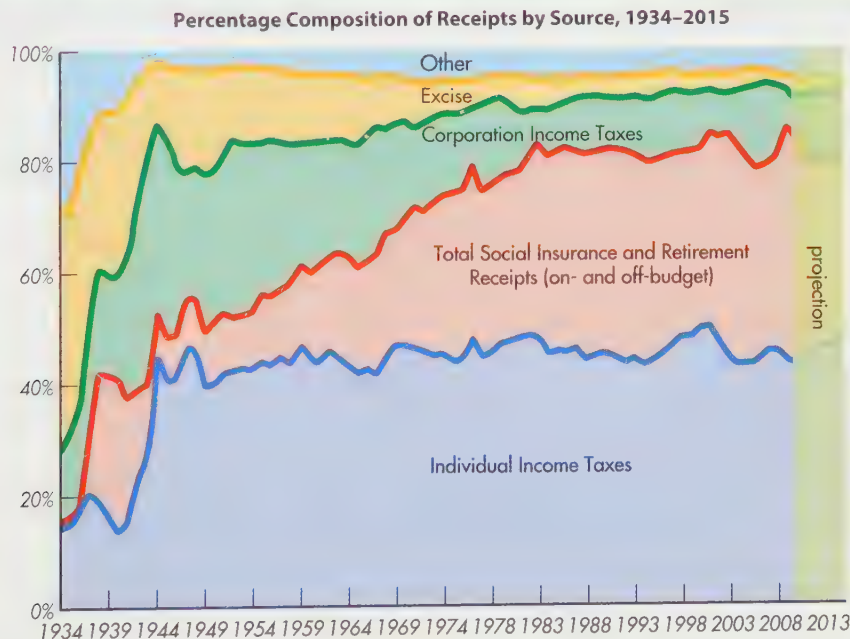
Government spending has risen faster than the economy (GDP) since 1910. The blue is federal spending, red is state spending, and the green is local spending.

Blue = total spending by federal government as % of GDP

Red = total spending by state government as % of GDP

Green = total spending by local governments as % of GDP

Source: [http://www.usgovernmentsspending.com/downchart\\_gs.php?year=1910\\_2015](http://www.usgovernmentsspending.com/downchart_gs.php?year=1910_2015)

**FIGURE 6** Sources of Government Revenues from 1934–the Present

In 1944, the source of government revenues was the individual income tax. Since then, the share of total revenues coming from the individual income tax has remained fairly constant. The fastest-growing revenues have come from payroll taxes, Social Security, and Medicare.

Source: Heritage Foundation; [www.heritage.org/charts](http://www.heritage.org/charts); 2011.

**FIGURE 7** Federal Revenues by Source

Most federal revenues come from individuals. Personal income taxes provide the largest portion of total tax revenues. Social Security and Medicare payroll taxes are the second-largest source.

PERCENTAGE OF TOTAL FEDERAL REVENUE (2009)



Individual income taxes provided 43.5% of total government revenues and social insurance (payroll taxes) 42.3%. All other sources are relatively small.

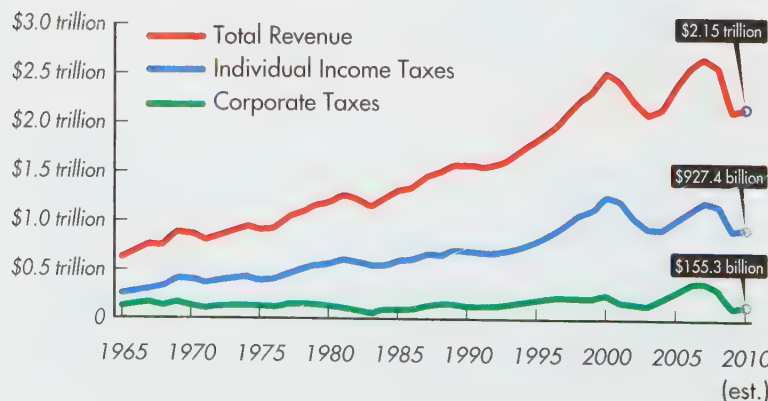
**Source:** Heritage Foundation; [www.Heritage.org/budgetchartbook](http://www.Heritage.org/budgetchartbook); accessed October 21, 2011.

**FIGURE 8** The Growth of Federal Government Revenues

Federal Government Revenues Have More Than Tripled Since 1965

Tax revenue have been rising historically despite a recent decline due to the recession. Income, Capital gains, and corporate tax cuts in 2001 and 2003 helped revenues surge.

INFLATION-ADJUSTED DOLLARS (2009)



Revenues have more than tripled since 1965. FICA has been the source of most of the increase. Individual income taxes have increased, but corporate taxes have remained about the same.

**Source:** Heritage Foundation; [www.Heritage.org/budgetchartbook](http://www.Heritage.org/budgetchartbook); accessed October 21, 2011.

The largest source of government revenue is the individual income tax. Taxes can be progressive, proportional, or regressive. **Progressive** means the higher the income, the higher is the tax rate; **proportional** is when the same tax rate applies to all income levels; **regressive** is when the higher the income, the lower is the tax rate. The income tax is a progressive tax, meaning that the higher the income, the higher is the tax rate.

The next largest tax is the Social Security tax, formally known as the Federal Insurance and Contributions Act (FICA). This tax is 6.2% of an employee's income paid by the employer, and 6.2% paid by the employee (12.4% total, employee's share reduced to 4% in 2011). Self-employed workers must pay both halves of the Social Security tax because they are their own employers. The Social Security tax is a proportional tax up to the income level at which the tax is no longer levied. Currently, the tax is levied on incomes below \$106,800. Income above \$106,800 is not taxed. Thus considering all income levels, the FICA tax is a regressive tax. A proportional tax maintains a constant tax rate as income rises. A regressive tax means that the higher is your income, the lower is the tax rate. Together, Social Security and Medicare taxes compose the payroll tax.

The government's revenues have mostly increased over the years. There are a few years where revenues declined, mostly years of recession.

### progressive tax

A tax where the rate increases as the base increases; for example, the tax rate rises as income rises.

### proportional tax

A tax where the tax rate is constant as the base increases; for example, the tax rate is 20% no matter the level of income.

### regressive tax

A tax where the rate decreases as the base increases; for example, a smaller rate applies to higher income levels than lower income levels.

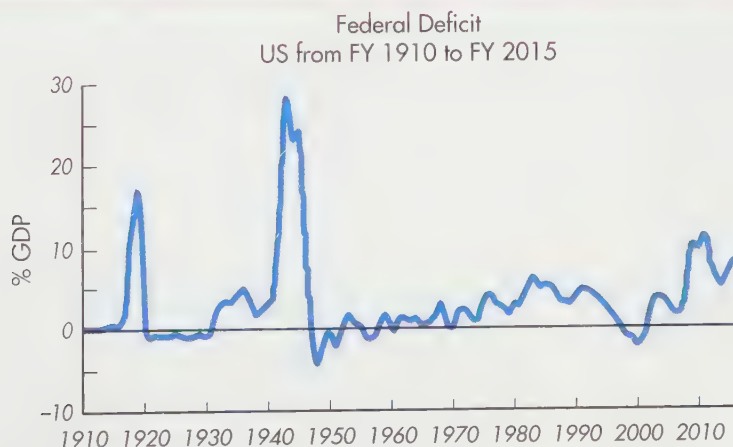
## 3.c. Deficits and Debt

The difference between revenue collected and expenditures is the deficit. The deficit is financed using debt. The federal government deficit as a percent of GDP is shown in Figure 9.

The government borrows by having the Treasury Department sell IOUs or bonds. This is government debt. It is no different than if you took out student loans. The loans are your debt; they enable you to spend more than your revenue, but at some point you have to pay them back.

In Figure 9 is the ratio of total government debt to GDP. The total federal government debt was about \$14 trillion in 2011 and will rise to about \$16 trillion in 2012. (See debt clock in real time at [www.usdebtclock.org](http://www.usdebtclock.org).)

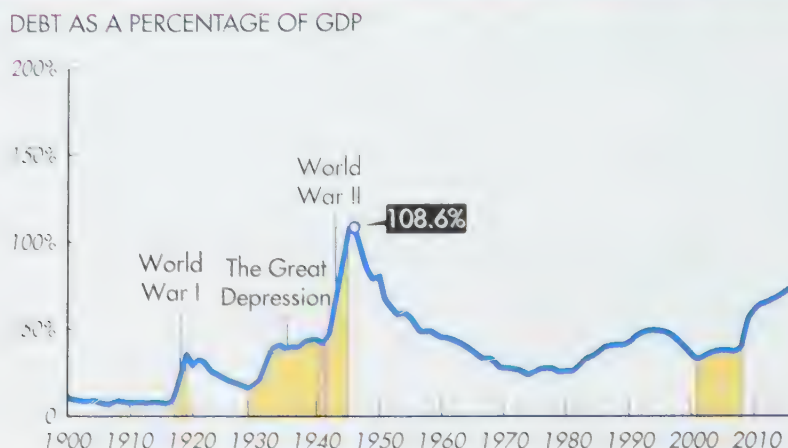
**FIGURE 9** Federal Deficit as a Percent of the Total Economy



When the government spends more than its revenue, it runs a deficit. Deficits were large in war years, smaller but positive in the 1980s and 1990s, and high in 2010 and 2011.

Source: Economic Report of the President.



**FIGURE 10** Total Debt as a Percentage of the Economy

Debt rose to pay for World War I, then the Great Depression, and World War II. It declined until 1980 and then rose until the late 1990s; since 2000 it has risen rapidly.

**Source:** Heritage Foundation compilations of data from U.S. Department of the Treasury, Institute for the Measurement of Worth (Alternative Fiscal Scenario), Congressional Budget Office, and White House Office of Management and Budget.

Figure 10 shows the amount of federal government debt to GDP since 1900. Other than during World War II, the amount of debt relative to GDP is the highest it has ever been.

### 3.d. International Comparisons

Government spending as a percentage of GDP from 1995 to 2010 for the OECD (Organization for Economic Cooperation and Development) is listed in Table 5. The OECD countries are mainly the developed nations of the world.

Total government spending as a percent of GDP for the OECD nations is shown in Table 5. You can see that the United States' government spending as a share of the economy is smaller than just a few countries.

The total government debt as a percentage of GDP in these nations is shown in Table 6. Those nations with higher debt than GDP are noted with yellow shading: Japan, Greece and Italy. Other countries with very large debt are Belgium, Hungary, Iceland, Israel, United Kingdom, and Portugal.

## RECAP

1. Government in the United States has only grown in size and number of activities since the founding of the United States.
2. Government spending in the United States has risen at all levels, municipal, state, and federal.
3. Except for World War II, U.S. government revenues basically matched U.S. government expenditures until the 1980s. Government revenues have fallen short of expenditures in most years of the last three decades.
4. Compared to other developed nations, the United States, until the last few years, had less government spending and less debt relative to GDP. Since 2008, the U.S. government debt relative to GDP has risen significantly.

**TABLE 5** Government Spending as a Percentage of GDP

|                 | 1996  | 1997  | 1998  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Australia       | 35.55 | 34.42 | 34.84 | 34.41 | 35.52 | 35.00 | 34.35 | 34.41 | 34.48 | 33.74 | 33.47 | 33.39 | 35.30 |       |
| Austria         | 55.95 | 53.69 | 53.96 | 53.67 | 52.13 | 51.60 | 50.95 | 51.50 | 54.01 | 50.16 | 49.39 | 48.48 | 48.78 | 52.32 |
| Belgium         | 52.49 | 51.23 | 50.43 | 50.18 | 49.14 | 49.18 | 49.84 | 51.12 | 49.44 | 52.27 | 48.64 | 48.45 | 50.20 | 54.22 |
| Canada          | 46.59 | 44.28 | 44.80 | 42.68 | 41.11 | 41.99 | 41.23 | 41.18 | 39.86 | 39.30 | 39.45 | 39.35 | 39.82 | 44.05 |
| Czech Republic  | 42.57 | 43.20 | 43.16 | 42.27 | 41.82 | 44.35 | 46.31 | 47.32 | 45.14 | 44.98 | 43.75 | 42.50 | 42.89 | 45.93 |
| Denmark         | 58.91 | 56.68 | 56.33 | 55.50 | 53.68 | 54.19 | 54.57 | 55.07 | 54.55 | 52.79 | 51.59 | 50.92 | 51.83 | 58.55 |
| Finland         | 60.03 | 56.51 | 52.89 | 51.68 | 48.29 | 47.83 | 48.85 | 50.15 | 50.04 | 50.18 | 49.03 | 47.25 | 49.35 | 56.01 |
| France          | 54.47 | 54.09 | 52.68 | 52.57 | 51.64 | 51.57 | 52.64 | 53.27 | 53.19 | 53.38 | 52.71 | 52.31 | 52.80 | 55.99 |
| Germany         | 49.31 | 48.35 | 48.03 | 48.06 | 45.11 | 47.56 | 48.10 | 48.49 | 47.09 | 46.84 | 45.31 | 43.56 | 43.75 | 47.50 |
| Greece          | 44.08 | 44.87 | 44.33 | 44.39 | 46.69 | 45.29 | 45.09 | 44.74 | 45.52 | 43.95 | 45.07 | 46.71 | 49.11 | 53.56 |
| Hungary         | 50.61 | 49.25 | 50.36 | 48.39 | 46.76 | 47.20 | 51.18 | 49.40 | 48.69 | 50.21 | 52.01 | 49.98 | 48.82 | 50.46 |
| Iceland         | 42.21 | 40.69 | 41.30 | 42.05 | 41.87 | 42.60 | 44.25 | 45.62 | 44.05 | 42.21 | 41.64 | 42.27 | 57.76 | 50.86 |
| Ireland         | 39.09 | 36.65 | 34.53 | 34.10 | 31.27 | 33.14 | 33.40 | 33.20 | 33.60 | 33.95 | 34.44 | 36.79 | 42.72 | 48.90 |
| Israel          | 53.11 | 52.59 | 51.47 | 50.45 | 48.50 | 51.08 | 52.21 | 51.59 | 48.59 | 46.59 | 45.89 | 44.94 | 44.30 | 44.27 |
| Italy           | 52.45 | 50.25 | 49.24 | 48.18 | 46.18 | 48.02 | 47.38 | 48.32 | 47.74 | 48.16 | 48.71 | 47.86 | 48.85 | 51.87 |
| Japan           | 36.71 | 35.72 | 42.46 | 38.60 | 39.05 | 38.55 | 38.82 | 38.41 | 37.02 | 38.44 | 36.17 | 35.90 | 37.08 |       |
| Korea           | 21.21 | 21.82 | 24.14 | 23.19 | 22.43 | 23.92 | 23.58 | 28.90 | 26.08 | 26.59 | 27.73 | 28.65 | 30.45 |       |
| Luxembourg      | 41.13 | 40.65 | 41.06 | 39.19 | 37.59 | 38.13 | 41.53 | 41.78 | 42.55 | 41.52 | 38.58 | 36.17 | 36.88 | 42.17 |
| Mexico          | ..    | ..    | ..    | ..    | ..    | ..    | ..    | 19.11 | 18.27 | 18.47 | 19.13 | 19.32 | 24.16 |       |
| Netherlands     | 49.43 | 47.54 | 46.67 | 46.02 | 44.17 | 45.35 | 46.21 | 47.10 | 46.09 | 44.79 | 45.54 | 45.27 | 46.04 | 51.35 |
| New Zealand     | 40.38 | 40.92 | 40.65 | 39.96 | 38.32 | 37.59 | 36.90 | 37.03 | 37.13 | 38.02 | 39.27 | 39.38 | 41.91 |       |
| Norway          | 48.50 | 46.83 | 49.08 | 47.69 | 42.30 | 44.11 | 47.06 | 48.18 | 45.43 | 42.11 | 40.47 | 41.13 | 40.62 | 46.33 |
| Poland          | 51.01 | 46.44 | 44.34 | 42.72 | 41.08 | 43.80 | 44.26 | 44.68 | 42.62 | 43.44 | 43.86 | 42.19 | 43.19 | 44.40 |
| Portugal        | 42.07 | 41.14 | 40.82 | 41.00 | 41.13 | 42.48 | 42.31 | 43.78 | 44.67 | 45.77 | 44.53 | 43.78 | 43.65 | 48.29 |
| Slovak Republic | 53.78 | 48.96 | 45.82 | 48.14 | 52.18 | 44.50 | 45.09 | 40.16 | 37.70 | 38.01 | 36.64 | 34.33 | 34.85 | 41.32 |
| Slovenia        | 44.45 | 44.83 | 45.71 | 46.49 | 46.73 | 47.56 | 46.34 | 46.38 | 45.84 | 45.20 | 44.51 | 42.43 | 44.13 | 49.02 |
| Spain           | 43.21 | 41.63 | 41.06 | 39.87 | 39.12 | 38.64 | 38.89 | 38.40 | 38.88 | 38.44 | 38.39 | 39.18 | 41.29 | 45.80 |
| Sweden          | 62.92 | 60.66 | 58.78 | 58.11 | 55.09 | 54.52 | 55.60 | 55.67 | 54.18 | 53.85 | 52.71 | 50.97 | 51.51 | 54.90 |
| Switzerland     | 35.29 | 35.52 | 35.77 | 34.30 | 35.10 | 34.78 | 36.16 | 36.39 | 35.95 | 35.27 | 33.48 | 32.32 | 32.23 | 33.74 |
| Turkey          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| United Kingdom  | 42.27 | 40.51 | 39.47 | 38.88 | 39.05 | 40.16 | 41.09 | 42.11 | 42.94 | 44.10 | 44.19 | 43.97 | 47.42 | 51.63 |
| United States   | 36.59 | 35.46 | 34.62 | 34.17 | 33.88 | 34.98 | 35.89 | 36.27 | 36.02 | 36.28 | 35.96 | 36.76 | 38.94 | 42.18 |
| Euro area       | 50.63 | 49.37 | 48.53 | 48.13 | 46.31 | 47.32 | 47.66 | 48.12 | 47.58 | 47.43 | 46.72 | 46.04 | 46.93 | 50.83 |

**TABLE 6** Total Government Debt as a Percentage of GDP

|                 | 1997  | 1998  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Australia       | 18.5  | 15.6  | 13.8  | 11.4  | 9.6   | 8.6   | 7.5   | 6.7   | 6.3   | 5.8   | 5.2   | 4.9   | 8.1   |
| Austria         | 59.2  | 59.9  | 62.0  | 61.2  | 60.7  | 60.4  | 60.9  | 62.2  | 62.1  | 60.6  | 58.1  | 59.6  | 64.3  |
| Belgium         | 109.9 | 105.3 | 103.4 | 99.5  | 99.1  | 97.9  | 95.4  | 92.8  | 91.8  | 87.6  | 85.3  | 90.2  | 95.3  |
| Canada          | 52.7  | 50.1  | 46.7  | 40.9  | 39.7  | 38.1  | 35.9  | 32.1  | 30.2  | 28.0  | 25.1  | 28.6  | 35.7  |
| Chile           | 13.2  | 12.5  | 13.7  | 13.6  | 14.9  | 15.7  | 13.0  | 10.7  | 7.3   | 5.3   | 4.1   | 5.2   | 6.1   |
| Czech Republic  | 9.6   | 9.8   | 11.0  | 13.2  | 14.7  | 16.1  | 19.1  | 21.1  | 23.2  | 24.9  | 25.2  | 27.1  | 32.5  |
| Denmark         | 69.1  | 64.0  | 60.9  | 54.8  | 52.0  | 51.6  | 49.6  | 47.0  | 39.3  | 32.7  | 27.8  | 32.4  | 37.8  |
| Finland         | 65.0  | 59.9  | 55.7  | 48.0  | 44.4  | 41.3  | 43.5  | 41.9  | 38.2  | 35.6  | 31.2  | 29.5  | 37.6  |
| France          | 45.6  | 46.3  | 47.8  | 47.4  | 48.3  | 49.9  | 51.9  | 52.6  | 53.3  | 52.1  | 52.1  | 54.2  | 60.8  |
| Germany         | 24.3  | 26.1  | 34.1  | 34.1  | 34.6  | 36.1  | 37.7  | 39.2  | 40.4  | 40.9  | 39.4  | 38.8  | 43.8  |
| Greece          | 105.2 | 103.7 | 103.6 | 108.9 | 109.7 | 109.2 | 105.8 | 108.3 | 110.3 | 107.5 | 105.8 | 109.6 | 125.7 |
| Hungary         | 60.9  | 59.0  | 59.1  | 54.1  | 50.5  | 53.6  | 56.3  | 55.7  | 58.1  | 61.9  | 61.3  | 68.2  | 72.7  |
| Iceland         | 46.2  | 40.7  | 35.3  | 33.8  | 39.2  | 35.3  | 33.3  | 28.2  | 19.4  | 24.8  | 23.2  | 44.3  | 87.2  |
| Ireland         | 57.4  | 47.8  | 44.1  | 34.8  | 30.9  | 27.9  | 26.9  | 25.4  | 23.6  | 20.3  | 19.8  | 27.7  | 46.0  |
| Israel          | 103.0 | 103.8 | 93.1  | 83.3  | 87.8  | 95.3  | 97.7  | 96.7  | 92.1  | 82.9  | 76.4  | 75.4  | 78.3  |
| Italy           | 111.0 | 108.7 | 106.7 | 103.6 | 102.7 | 99.5  | 96.8  | 96.2  | 97.5  | 96.7  | 95.2  | 98.0  | 106.6 |
| Japan           | 76.7  | 87.7  | 97.0  | 106.1 | 123.5 | 137.6 | 140.9 | 156.7 | 164.3 | 161.4 | 164.2 | 178.0 | .     |
| Korea           | 10.0  | 14.3  | 16.3  | 16.7  | 17.4  | 17.6  | 20.7  | 23.7  | 27.6  | 30.1  | 29.7  | 29.0  | 32.6  |
| Luxembourg      | 3.7   | 4.1   | 3.5   | 3.2   | 3.1   | 2.7   | 1.7   | 1.4   | 0.8   | 1.4   | 1.4   | 8.2   | 8.6   |
| Mexico          | 23.5  | 25.4  | 23.3  | 21.2  | 20.5  | 21.9  | 22.1  | 20.7  | 20.2  | 20.5  | 21.0  | 24.5  | 28.2  |
| Netherlands     | 53.9  | 52.0  | 49.2  | 44.1  | 41.3  | 41.5  | 43.0  | 43.8  | 43.0  | 39.2  | 37.8  | 50.1  | 49.9  |
| New Zealand     | 36.3  | 37.9  | 35.1  | 32.2  | 30.2  | 28.5  | 26.4  | 23.8  | 22.1  | 21.6  | 20.4  | 20.6  | 27.5  |
| Norway          | 24.7  | 22.2  | 20.9  | 19.3  | 18.1  | 19.0  | 21.3  | 18.4  | 17.2  | 12.5  | 11.7  | 13.8  | 26.1  |
| Poland          | 43.0  | 39.5  | 39.7  | 35.8  | 36.4  | 40.6  | 44.9  | 43.6  | 44.8  | 45.1  | 42.6  | 44.8  | 47.1  |
| Portugal        | 58.0  | 54.8  | 55.1  | 54.1  | 56.0  | 58.7  | 60.2  | 63.0  | 68.2  | 69.8  | 69.2  | 71.2  | 81.1  |
| Slovak Republic | 20.8  | 22.5  | 22.7  | 23.9  | 36.0  | 35.1  | 35.1  | 38.4  | 33.1  | 29.2  | 28.1  | 26.3  | 33.6  |
| Slovenia        | ..    | ..    | ..    | ..    | ..    | ..    | 26.9  | 27.1  | 26.9  | 25.8  | 23.2  | 21.3  | 34.1  |
| Spain           | 55.3  | 53.6  | 52.3  | 49.9  | 46.3  | 43.9  | 40.7  | 39.3  | 36.4  | 33.0  | 30.0  | 33.7  | 46.1  |
| Sweden          | 74.1  | 72.0  | 64.0  | 56.9  | 48.6  | 46.8  | 47.7  | 46.6  | 46.2  | 42.3  | 36.4  | 35.5  | 37.8  |
| Switzerland     | 25.3  | 27.7  | 25.4  | 25.6  | 24.8  | 28.2  | 28.3  | 28.1  | 28.1  | 25.2  | 23.2  | 22.5  | 20.7  |
| Turkey          | 32.9  | 31.0  | 39.8  | 38.2  | 74.1  | 69.2  | 62.2  | 56.6  | 51.1  | 45.5  | 39.6  | 40.0  | 46.3  |
| United Kingdom  | ..    | 49.7  | 44.1  | 42.2  | 38.8  | 39.1  | 38.7  | 40.0  | 43.4  | 43.3  | 42.6  | 61.3  | 75.1  |
| United States   | 45.4  | 42.5  | 39.0  | 33.9  | 32.4  | 33.2  | 34.9  | 36.0  | 36.1  | 36.0  | 35.6  | 40.0  | 53.1  |



## SUMMARY

### 1. What is antitrust policy?

- Antitrust policy is an attempt to enhance competition by restricting certain activities that could be anticompetitive. §1
- The antitrust statutes include Sections 1 and 2 of the Sherman Antitrust Act, which forbid conspiracies and monopolization; Sections 2, 3, and 7 of the Clayton Antitrust Act, which prohibit anticompetitive pricing and nonprice restraints; and Section 5 of the Federal Trade Commission Act, which prohibits deceptive and unfair acts. §1.a, Table 1
- Interpretation of the antitrust statutes has gone through several phases. In the early years, a rule of reason prevailed; acts had to be unreasonable to be a violation of the statutes. Between 1914 and 1980, a per se rule was applied more often. Under this policy, the mere existence of actions that could be used anticompetitively was a violation. In the early 1980s, the interpretations returned to the rule-of-reason standard. §1.c
- The Herfindahl index is used to measure size and influence; industries with a Herfindahl index above 1,800 are considered highly concentrated. §1.c
- Although each country has its own antitrust laws, the International Competition Network, an organization of about 90 nations, has attempted to create more similar laws. §1.d

### 2. What is the difference between economic regulation and social regulation?

- Economic regulation refers to the prescription of price and output for a particular industry. Social regulation refers to the setting of health and safety standards for products and the workplace, and environmental and operating procedures for all industries. §2
- Because monopoly is inefficient and perfect competition is efficient, governments have attempted to regulate natural monopolies to make them more like perfect competitors. The huge economies of scale involved rule out

breaking up the natural monopolies into small firms. Instead, price has been set at a fair rate of return,  $P = ATC$ . §2.a

- Social regulation has increased even as economic regulation has decreased. §2.c
- Regulations create costs and provide benefits. The economist's view is that a regulation should be implemented only if its benefits exceed its costs. §2.c.1
- Deregulation in other developed countries took the form of privatization: the selling, auctioning, or contracting out of a government enterprise to private interests. §2.d

### 3. What international agencies regulate business behavior?

- The World Trade Organization (WTO) is intended to lower tariffs and increase trade. §2.d
- The WTO was created on January 1, 1995, by the Uruguay Round of the GATT. It is located in Geneva. §2.d

### 4. How does government pay for its activities?

- Governments at all levels—federal, state, and local—collect taxes to pay for their activities. When governments do not collect enough taxes to pay expenses, then governments borrow. §3.a, 3.b, 3.c
- Government spending has risen as a percentage of GDP since about 1910. §3.a
- In the United States the largest tax is the income tax. At the federal government level, the next largest tax is the payroll or FICA—Social Security and Medicare—tax. §3.b
- Debt as a percentage of GDP has risen in recent years. §3.c
- Governments in developed nations around the world spend, tax, and run debts. Some governments are much bigger as a percentage of GDP than is the case in the United States. §3.d

## KEY TERMS

antitrust policy, 247  
 contracting out, 254  
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privatization, 254  
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 proportional tax, 263  
 regressive tax, 263

social regulation, 252  
 stranded assets, 254

## EXERCISES

- Using the average-total-cost and marginal-cost curves, demonstrate what huge fixed costs and near-zero marginal costs mean for the average-total-cost curve.
- Using the demand and cost curves of an individual firm in oligopoly, demonstrate the effects of each of the following:
  - The Clean Air Act
  - The Nutrition and Labeling Act
  - A ban on smoking inside the workplace
  - A sales tax
- Kodak has developed an important brand name through its advertising, innovation, and product quality and service. Suppose Kodak sets up a network of exclusive dealerships, and one of the dealers decides to carry Fuji and Mitsubishi as well as Kodak products. If Kodak terminates the dealership, is it acting in a pro- or anticompetitive manner?
- Explain why a market in which broadcast licenses can be purchased might be more efficient than having the FCC assign licenses on some basis designed by the FCC.
- Which of the three types of government policies—antitrust, social regulation, and economic regulation—is the basis for each of the following?
  - Beautician education standards
  - Certified Public Accounting requirements
  - Liquor licensing
  - Justice Department guidelines
  - The Clean Air Act
  - The Nutrition and Labeling Act
- Some airline executives have called for reregulation. Why might an executive of an airline prefer to operate in a regulated environment?
- Suppose the Herfindahl index for domestic production of televisions is 5,000. Does this imply a very competitive or a noncompetitive environment?
- Suppose a monopolist is practicing price discrimination and a lawsuit against the monopolist forces an end to the practice. Is it possible that the result is a loss in efficiency? Explain.
- The Justice Department sued several universities for collectively setting the size of scholarships offered. Explain why the alleged price fixing on the part of universities might be harmful to students.
- The FDA is considering the adoption of a higher standard of success in clinical trials for any pharmaceutical that the agency will permit to be sold in the United States. Explain how a cost-benefit calculation would be carried out.
- Suppose that in exercise 10, the benefits of the regulation were 1,000 lives saved per year. Would you support adoption of the regulation? Explain.
- Explain what the costs of the regulation are in the scenario in exercises 10 and 11.
- What does a loss of consumer surplus mean? In the case of exercises 10–12, exactly how do the losses of consumer surplus occur?
- Go to <http://www.heritage.org> and find the Economic Freedom map. Use the map to determine the most economically free continent and the least economically free continent. Then do a search to find out the real GDP per capita of people in representative countries of those continents.
- What is the pattern of U.S. government as a share of the total economy since the 1900s?
- What is government debt? Why has it increased or decreased?
- Is the United States the nation with the most government debt? If not, who is?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



## AN UNBOUND INDIA FLOURISHES, BUT THE JOB'S NOT YET DONE

*The Globe and Mail (Canada), July 18, 2007*

One day in the 1980s, Gurcharan Das found himself arguing with the finance minister of India about the value of face creams for women. Mr. Das, then an executive with Procter & Gamble, was pleading with the minister to lower India's 120-percent excise duty on toiletries, which were making it hard for P&G to sell its Oil of Olay cream to Indian women.

"A face cream won't do anything for an ugly face," said the minister impatiently. "These are luxuries of the rich."

When Mr. Das protested that even a young woman from the village used traditional beauty pastes, the minister said, "No, it's best to leave a face to nature."

"Sir," Mr. Das objected, "how can you decide what she wants? After all, it is her hard-earned money."

"Yes, and I don't want her wasting it. Let her buy food," said the minister, ending the meeting with an imperious wave of his hand.

Those were the bad old days. Like many Indian executives, Mr. Das spent hours in the stale corridors of Delhi's government offices, suffering the disdain of countless time-serving officials as he tried to negotiate a web of taxes, regulations, and restrictions.

Under the Licence Raj, as India's stifling business rules were called, "you could actually go to jail

for producing more than your approved limit. A farmer could not sell his produce beyond state borders. A young entrepreneur faced up to 37 functionaries and inspectors, each of them wanting his cut. It was a crime to invite your customer to lunch abroad while travelling because it exceeded your foreign exchange allowance."

These were more than just minor annoyances for Indian businessmen. The Licence Raj held India back for decades, curbing its economic growth as first Japan, then South Korea, Taiwan, and Hong Kong, and then China leapt from poverty to prosperity. "By suppressing economic liberty for 40 years, we destroyed growth and the futures of two generations," he writes in his 2000 book *India Unbound*.

That made Mr. Das mad, and he wasn't afraid to say so. A government official's son educated at Harvard on a scholarship, he had no patience for the petty tyranny of Indian officialdom. He once even had the nerve to challenge the regal Indra Gandhi. "Does the market always make the right decisions?" she demanded when he questioned the Licence Raj after a speech she gave to a business audience.

"Not always, madam, but always better than bureaucrats," Mr. Das replied.

"Ah," she said with a condescending smile, "we have a market-wallah, do we?"

He doesn't have to suffer that kind of sneering any more. Since finance minister (now Prime Minister) Manmohan Singh introduced market-oriented reforms in 1991, the Licence Raj has crumbled. India is, indeed, unbound. With its natural entrepreneurial talent liberated, the country has registered steadily accelerating economic growth, which touched 9 per cent last year, close to booming China's.

Unlike China's government-directed, top-down formula, India's miracle has been "a people's success—a success from below," Mr. Das says.

"It has happened in spite of the state, not because of the state," he said in a recent conversation as he walked his dog in Delhi's sprawling Lodhi Garden.

The Italian saying, he says, applies equally to India: "The economy grows at night when the government sleeps."

In every sector where the government has stopped meddling, from telecoms to airlines, private industry has grabbed the ball and run with it. But the job isn't done yet. While socialist follies like central planning and import substitution have largely been done away with, India still limits foreign investment, still restricts companies' ability to let unneeded employees go, and still operates too many companies itself.



India's government, says Mr. Das, needs to stop doing what it should not be doing: mucking with the market.

Just as important, it needs to start doing what it should be doing.

Government's role in enabling economic development is to make sure that basic health care is provided to its citizens; to direct the building of roads, airports, and sea ports to carry the nation's products; and to regulate the market with clear and legally enforceable rules; and, most important, to educate young people so that they can do the work of a modern economy.

As it stands, primary education is a wreck. One-quarter of Indian school teachers don't even show up for work. One in four

men and one in two women cannot read or write. "The Indian state's biggest failure has been in building human capabilities," Mr. Das writes in *India Unbound*.

India's economy may grow while government sleeps, but India won't truly prosper until government wakes up and does its job.

### Making India His Business

Gurcharan Das grew up in modest circumstances as the son of a public works official for irrigation and canals.

The family moved to Washington, D.C., in the 1950s when his father was posted there to negotiate with newly created Pakistan over the sharing of rivers. When they returned to India,

Mr. Gurcharan stayed on to finish high school and then take a scholarship at Harvard, where he graduated with honours and attended the business school.

Homesick, he returned to India to work as a minor executive for Vicks, travelling around the country promoting its famous Vaporub. He worked his way up to chief executive officer of Procter & Gamble India and then director of strategic planning for Procter & Gamble Worldwide. Since taking early retirement, he has been a consultant to industry and government. He writes a column for the *Times of India* and has written several plays and a novel, *A Fine Family*.

MARCUS GEE

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Source: Marcus Gee.

This article contains quite a few important points. First, notice the attitude of the finance minister. He knows best. He knows better what the woman should do with her money than does the woman. This attitude is common among people who do not like the market outcome. They know better than the market. Second, the bad old days—the days of the License Raj—were days when economic freedom in India was extremely low. Things have improved, as the article notes, but have a long way to go. The Economic Freedom Index in 2009 ranked India the 123rd freest in the 2009 index. Its score is only 0.3 point higher than last year because improvements in financial freedom, government size, and business freedom were offset by significant decreases in investment freedom and labor freedom. India is ranked 25th out of 41 countries in the Asia-Pacific region, and its overall score is below the world average.

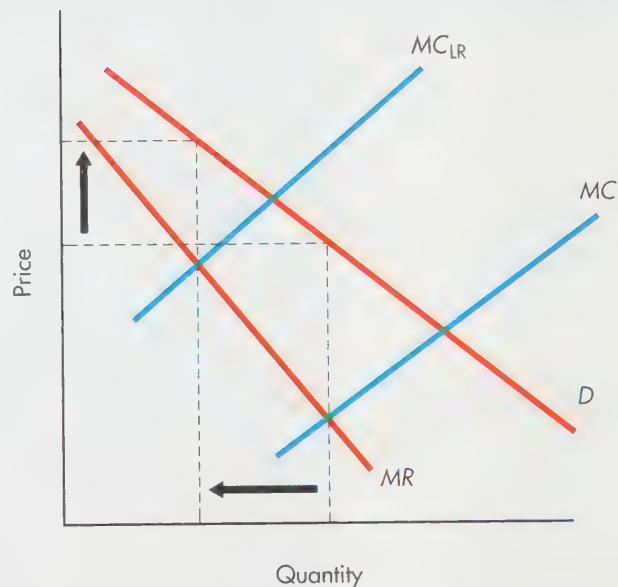
Although it has given up central planning, India continues to move forward only slowly with market-oriented economic reforms. The average tariff rate is high, and nontariff barriers further impede trade. Foreign investment is overly regulated, and the judicial system remains clogged by a large case backlog. Public debt is high, and the general government fiscal deficit continues to grow. The following table compares India with the average of all countries in each element of economic freedom.

**Ten Economic Freedoms of India\***

| Economic Freedom        | India | Avg  |
|-------------------------|-------|------|
| Business freedom        | 54.4  | 64.3 |
| Investment freedom      | 30.0  | 48.8 |
| Trade freedom           | 51.0  | 51.0 |
| Financial freedom       | 40.0  | 49.1 |
| Fiscal freedom          | 73.8  | 74.9 |
| Property rights         | 50.0  | 44.0 |
| Government size         | 77.8  | 65.0 |
| Freedom from corruption | 35.0  | 40.3 |
| Monetary freedom        | 69.3  | 74.0 |
| Labor freedom           | 62.3  | 61.3 |

\*Economic Freedom Index 2009, <http://www.heritage.org/index/Country/India>.

Regulations and red tape increase the cost of doing business. Consider the following graph of a non-perfectly competitive firm. The marginal cost  $MC$  represents what business costs would be with a much better business freedom. The marginal cost  $MC_{LR}$  represents the higher costs due to the regulations under the License Raj.<sup>6</sup> Notice that output is lower and prices higher.



Indira Gandhi, whose father began India's independence with a centrally planned economy, asked whether the market always makes the right decision. After reading this and the next chapter, we might respond to Gandhi as follows: There are times when markets fail due to lack of private property rights or imperfect information, but generally private actions and markets can solve the difficulties. There are times, perhaps, when certain limited government actions are useful, but central planning, where everything is controlled by a central authority, creates many more failures.

<sup>6</sup> Permit Raj (or License Raj) refers to the licenses, regulations, and the accompanying red tape that were required to set up and run business in India between 1947 and 1990. The License Raj was a result of India's decision to have a centrally planned economy. For more on the permit raj and the Prime Minister Manmohan Singh's attitude toward it see: <http://www.andhranews.net/India/2011/Govt-wont-allow-return-permit-raj-6587.htm>.

Although both China and India are moving toward private property rights and market economies, they are taking very different routes, as the article says. India is attempting to reduce regulations and red tape and just let the people go at it. China is attempting to control each step and to move

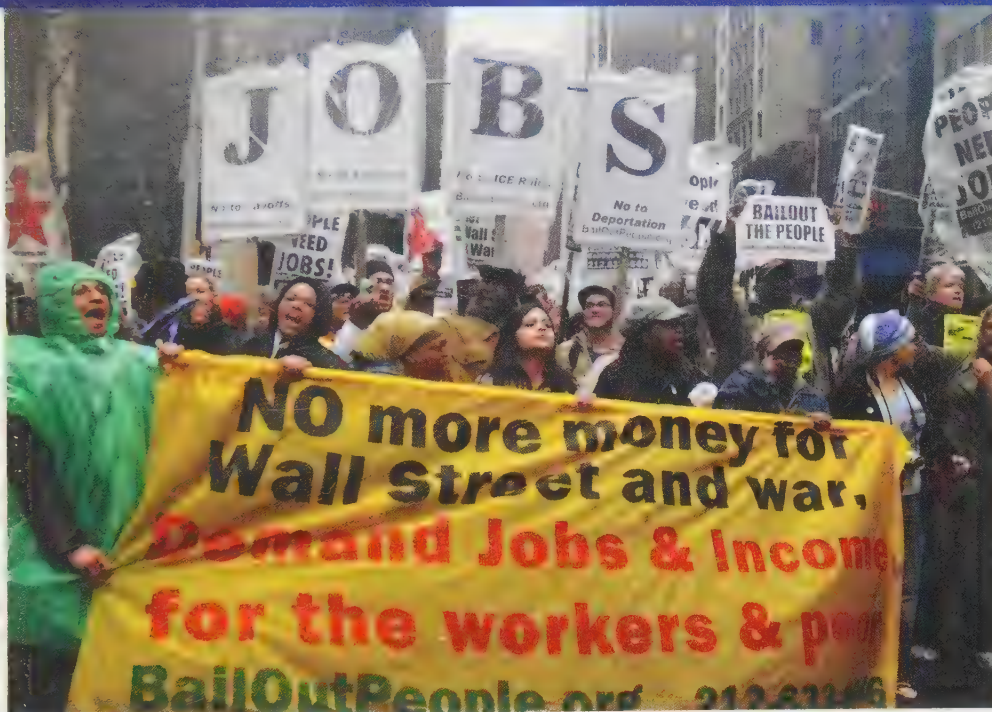
incrementally toward some private property rights and markets. Which approach will be more successful will require some time to determine. Nevertheless, as the article notes, in those sectors of India where government has stopped meddling, the sectors have done very well.



## CHAPTER 13

# Market Failures, Government Failures, and Rent Seeking

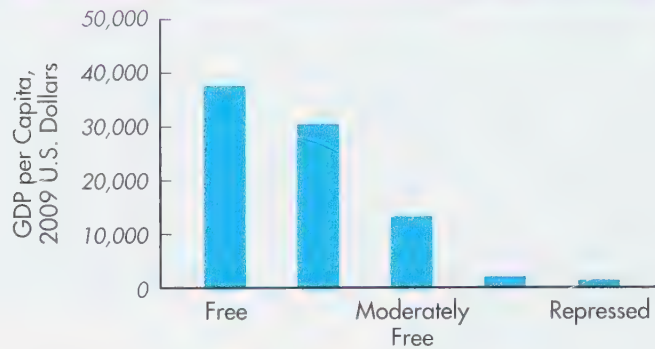
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### FUNDAMENTAL QUESTIONS

- 1 What are the benefits of free markets?
- 2 How are private property rights defined?
- 3 Why does a lack of private property rights lead to market failures?
- 4 What are externalities?
- 5 What are free rider problems?
- 6 How does the government solve externality and free rider problems?
- 7 What are moral hazard and adverse selection problems?
- 8 What are network externalities?
- 9 Is government intervention necessary or justified to solve market failures?

**A**s we noted in the last chapter, economic freedom is a measure of the degree to which government gets involved in private transactions. In general, the greater a nation's economic freedom, the higher its standard of living, as shown in Figure 1. Economies rated "free" or "mostly free" in the 2009 Economic Freedom Index have per-capita incomes that are more than double the average levels in all other countries and more than eight times higher than the "repressed" economies. The prosperity that flows from economic freedom results in greater access to education, reduced illiteracy, increased access to higher quality health care and food supplies, and longer life expectancy. In other words, economic freedom leads to a higher quality of living. As shown in Figure 2, the United Nations

**FIGURE 1** Economic Freedom and Correlation with Standard of Living

Measured as GDP per capita, Purchasing Power Parity Method.

**Sources:** 2009 Index of Economic Freedom (Washington, D.C.: The Heritage Foundation and Dow Jones & Company, Inc., 2009) at <http://www.heritage.org/index>. International Monetary Fund, World Economic Outlook database, April 2007, at <http://www.imf.org>.

**FIGURE 2** Economic Freedom and Human Development

**Sources:** 2009 Index of Economic Freedom (Washington, D.C.: The Heritage Foundation and Dow Jones & Company, Inc., 2009) at <http://www.heritage.org/index>. Human Development Reports 2007/2008, U.N. Human Development Programme, at <http://hdr/undp.org>.

Human Development Index, which measures life expectancy, literacy, education, and the standard of living in countries worldwide, is strongly correlated with economic freedom.

If free markets and economic freedom lead to higher standards of living and a better quality of living, why does the government play such a large role in the economy? There are two arguments against unfettered free markets. First, the markets do not always work to allocate resources to their highest-valued uses. In other words, markets sometimes fail. A **market failure** occurs when the market outcome is not the socially efficient outcome—that is, when resources are not allocated to their highest-valued use and people don't get what they are willing and able to buy at the lowest possible price. So when a market failure occurs, it is argued that

#### **market failure**

A situation in which resources are not allocated to their highest-valued use.

the government must intervene to solve the failure. Second, even though the unfettered market may lead to higher standards of living, it also causes some businesses to fail and some people to do without. It is sad to see people lose jobs, for people to do without homes or cars or other goods; it is sad to see people in poverty. Also, governments may provide monopolies to specific businesses or provide aid to other businesses for a variety of reasons. So, speaking very generally, a second reason that government intervenes in free markets is because people do not like the outcome of a free market; they want to change the result of the market. In this chapter, we discuss the market failure arguments.

In this chapter we also discuss the economic theory of market failures, as well as the normative economics of what should be done about potential market failures.<sup>1</sup>

<sup>1</sup> What we discuss is the broad consensus among economists. If you want to read more contrarian views on the failures of governments to increase efficiency and on what some refer to the myth of market failures, see the Internet chapter "Government Failures and Markets."



# 1. Private Property Rights

In 1978 in Xiaogang, Anhui province—the heart of China’s rice-growing region—20 families held a secret meeting to find ways to combat starvation. This was just after Mao’s death when communist rule was very strict. The system that the communists had in place was generating less and less food. Under this system, everybody was collectively responsible for tilling the land and everybody had a share in the land’s output. You got your rice share whether you worked hard or not and, as a result, people hardly worked.

The villagers of Xiaogang decided they would divide up the land and farm it individually with each person keeping the output of his own land. They had to keep this arrangement secret out of fear of the communist authorities. But as rice production in Xiaogang continued to rise, the secret became known. Neighboring villages discovered the secret and implemented their own arrangements. It was not long until the communist authorities found out. In 1982 the Communist Party decided to allow some individual farming.<sup>2</sup>

**Private property rights** mean that when you own something, that something is yours to do with as you want—at least as long as you do not harm others. This seems like such a simple idea. Think about renting a house or renting a car. You don’t take care of it in the same way you do when you own the house or own the car. You have no incentive, other than avoiding a fee for damages, because if you spend the time, effort, and money to maintain the house or car or improve it, you get nothing in return.

When private property rights are secure, others, including governments and organizations, are not allowed to steal or damage your private property. When private property rights are not secure, people are unlikely to be able to sell the things they own or to use them for collateral on a loan or pass them along to family. And they have much less incentive to improve the property because they are not assured of keeping their property.

The farmers in Xiaogang who agreed to divide up the land for cultivation could not sell their land or even pass it along to family. Although their produce was privately owned, the land on which it was grown belonged to the state. The amount of rice raised on the so-called private plots was significantly greater than when everything was communal, but there was a limit on what could be done with the property and thus a limit to possible returns on that land.

Private property rights are crucial to a market; without ownership of a good or resource, no one can voluntarily exchange that good or resource and the value of that good or resource cannot be determined. So what happens when private property rights do not exist or are not well defined and secure?

## 1.a. Private, Public, Common, and Club Goods

The **principle of mutual excludability** refers to a well-defined private property right. It says that if you own a good, I cannot use it or consume it without your permission; and if I own a good, you cannot use it or consume it unless I grant permission. When I purchase a pizza, it is mine to do with as I wish. You have no right to the pizza unless I provide that right. The **principle of rivalry** says that when I consume or use a good or service, that reduces the amount available to anyone else. When I eat a piece of pizza, less of the pizza remains; this is what is meant by rivalry. When excludability and rivalry exist, private property rights are easy to define.

Table 1 illustrates the role of excludability and rivalry in defining private property rights. If a good is both excludable and rivalrous, then the good is a **private good**. Property rights to private goods are easily established. If a good is excludable but nonrivalrous, such as cable television, then the good is called a **club good**. The name, club,



**1** What are the benefits of free markets?

### private property rights

The right of individuals to own property.



**2** How are private property rights defined?

### principle of mutual excludability

The rule that an owner of private property is entitled to enjoy the consumption of that property privately.

### principle of rivalry

When one consumes or uses a good or service, less remains for others.

### private good

A good that is both excludable and rivalrous.

### club good

A good that is excludable but nonrivalrous.

<sup>2</sup> William Easterly, *The White Man’s Burden*, New York: Penguin Press, 2006, p. 108.



| TABLE 1 Classification of Goods |  |  |
|---------------------------------|--|--|
|                                 | Excludable   | Nonexcludable  |
| Rivalrous                       | Private Goods<br><i>Food, clothing, toys, furniture, pizza</i> | Commons Goods<br><i>Fish, water, air</i>                                   |
| Nonrivalrous                    | Club Goods<br><i>Cable television, private golf courses</i>    | Public Goods<br><i>National defense, free-to-air television, MP3 files</i> |

**public good**  
A good that is nonexcludable and nonrivalrous.

**commons good**  
A good that is rivalrous but nonexcludable.

**free rider**  
A consumer or producer who enjoys the benefits of a good or service without paying for that good or service.



**3** Why does a lack of private property rights lead to market failures?

makes sense since people have to belong to the “club” to be able to enjoy the good or service. People can be excluded from its use so that private ownership can occur. Rivalry may occur in the case of a club good when the club good becomes congested—for example, too many people trying to play golf on the private golf course makes the potential players compete for playing time. In most cases, private property rights to the club can be established—membership can be purchased.

In the case where neither the principle of mutual exclusivity nor the principle of rivalry apply, the good is called a **public good**. The exchange of MP3 music files on the Internet is nonrivalrous and nonexcludable: The use of these files by any one person does not restrict the use by anyone else, and there is little effective control over the exchange of these music files.

If a good is rivalrous but nonexcludable, such as fish in oceans and parks, then the good is called a **commons good**. The establishment of ownership over commons goods is difficult.

Without well-defined and secure private property rights, such as with commons and public goods, market failure may occur. If something is available for you to use and you don’t have to pay for it, why would you pay? That’s a problem with both common and public goods: People can get these goods without paying for them. When goods are nonexcludable, an individual has an incentive to be a **free rider**—a consumer or producer who enjoys the benefits of a good or service without paying for that good or service. Examples of public goods that are often given are national defense, lighthouses, fire protection, and police protection. If one rich person established a missile defense system on her property, all her neighbors would enjoy the protection without paying anything. A problem would arise because you would be protected whether or not you paid for the national defense as long as others, your neighbors, paid. Of course, because each person has an incentive not to pay for it, few will voluntarily do so. As a result, the good may not be provided, or, if it is provided, the quantity produced will be “too small” from society’s viewpoint.

Lighthouses warn passing ships about rocks and land masses. Because any ship can see the light and heed the warning, none of them has an incentive to pay for the service. So no one provides a lighthouse. These are *market failures*: **too few resources are devoted to the production of the public good**.

1.b. Externalities

In 2011 the price of a gallon of gasoline in the U.S. exceeded \$4 per gallon. This caused a few people to abandon their SUVs, purchasing smaller, gasoline-efficient or hybrid cars. Nevertheless, many people continued to drive those larger SUVs that got perhaps eight or nine miles per gallon. The decision to purchase and drive the SUV affects people other than just the owner and driver. The emissions are larger than those of a small

car or a hybrid car. In addition, if a collision between an SUV and a small car occurs, the inhabitants of the SUV are much less likely to be injured. Yet the SUV owners don't have to compensate the small car owners for putting their lives at risk. Nor do they compensate people with breathing problems that are made worse by the emissions created as the SUVs cruise around town. But since these are the costs of driving the less fuel-efficient car, someone has to pay. The problem is that it is people who are not voluntarily part of the transaction to purchase the SUV who have to pay.

Because costs are imposed on people who are external to the decision to purchase and drive the SUV, these costs are called **externalities**. The problem created by externalities is that the price does not reflect all the costs. If it did, the price of the SUVs would be higher and fewer would be purchased. This means that *too many* SUVs are driven, *too much* pollution is created, and *too much* risk is created for drivers of smaller vehicles. The *too many* and *too much* refer to the quantities that would occur if there were no external costs.<sup>3</sup>

The price someone pays for the SUV is the **private cost** of that SUV. But the SUV comes with the external costs. The cost to society is the sum of private costs and external costs. When you buy a Big Mac, the price you pay for the Big Mac is the private cost of that food item. But the Big Mac comes in a cardboard wrapper. When you throw the wrapper into a garbage can two blocks away, you are creating a cost that you are not paying. You did not voluntarily transfer ownership of that wrapper; you simply dumped it. As a result, people who had nothing to do with that Big Mac must pay the cost of picking up the garbage.

Externalities may be negative or positive. The examples just given are *negative externalities*. A *positive externality* may result when the benefits of an activity are received by consumers or firms that are not directly involved in the activity. For instance, inoculations for mumps, measles, flu, and other communicable diseases provide benefits to all of society. If some people get a flu shot, you may have less chance of getting the flu even though you did not get a flu shot. You receive a positive externality from those who were vaccinated.

The total cost of a transaction, the private cost plus the external cost, is called the **social cost**. If all the costs and benefits of a transaction are borne by the participants in that transaction, the private costs and the social costs are the same. When private costs differ from social costs, the full opportunity cost of using a scarce resource is borne not by the producer or the consumer, but by others. When you don't have to pay the full cost of a good or service, you will consume more than you would if you had to pay the full cost. In this sense, "too much" of the good or service is consumed. If the owners of SUVs were directly responsible for the social costs borne by those in smaller cars and for the extra pollution emitted by the SUV, then fewer consumers would have an incentive to purchase SUVs. Similarly, if you bought ownership of the wrapper each time you purchased a Big Mac and had to pay for each wrapper you threw away, you would have had an incentive to consume or produce less of the product and thus pollute less.

When not all aspects of a transaction are privately owned—that is, whenever there is a divergence between social costs and private costs—the result is either *too much* or *too little* production and consumption. In either case, resources are not being used in their highest-valued activity. For instance, those who pollute do not bear the entire costs of the pollution; therefore, they pollute more than they otherwise would. Those who smoke do not pay a cost for secondhand smoke; therefore, they tend to smoke more than they otherwise would. Those who get flu shots provide some protection for those

### externality

The cost or benefit of a transaction that is borne by someone not directly involved in the transaction.



### 4 What are externalities?

### private cost

Cost that is borne solely by the individuals involved in the transaction that created the costs.

### social cost

The total cost of a transaction, the private cost plus the external cost.

<sup>3</sup> You may have noticed that we have moved from positive to normative. "Too much," "too many," and "too few" are normative statements, comparing outcomes with those derived under perfect competition.

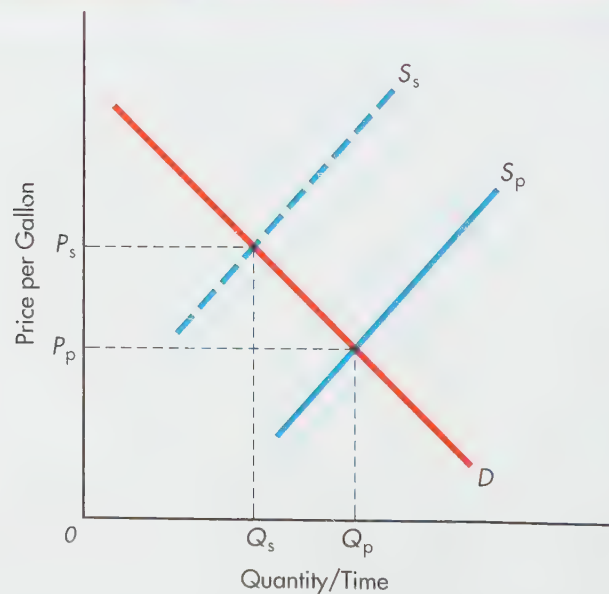
who do not get the shots, but those who benefit from others getting the inoculations don't pay for the benefit. If they did, it would lower the price for those who purchase the shots, and more people would get the inoculations.

$$\text{Social cost} = \text{private cost} + \text{value of externality}$$

To illustrate an externality using a typical market diagram, consider a gas station selling gasoline with pumps that have no emission-control equipment. Each time a consumer pumps gas, a certain quantity of pollutants is released into the air. Consumers are willing and able to purchase gasoline at various prices, as shown by the demand curve,  $D$ , in Figure 3. Gas is supplied according to the supply curve  $S_p$ . The equilibrium price and quantity are  $P_p$  and  $Q_p$ . The pollution imposes costs on society, but neither those selling the gas nor those buying the gas pay these costs. If the gas station did have to account for the pollution costs, its costs of supplying the gas would rise. The supply of gas would be given by the supply curve  $S_s$ , because with higher costs, firms are willing and able to supply less at each price. The (social) equilibrium, the equilibrium taking into account all costs and benefits, is the intersection of demand and supply at price  $P_s$  and quantity  $Q_s$ .

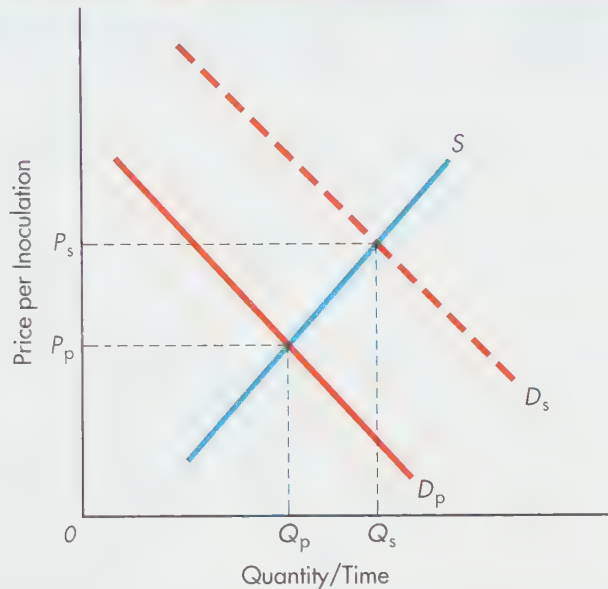
In contrast to negative externalities, private costs exceed social costs when external benefits are created. Figure 4 represents the market for inoculations against some communicable disease. People would be willing and able to purchase the inoculations according to  $D_s$  if there were no externalities. However, because some people in society can benefit from the inoculations without purchasing them, the demand for the inoculations is less ( $D_p$  instead of  $D_s$ ). This means that fewer people receive the inoculations than would be the case if the price took all the benefits into account. The social

**FIGURE 3** Negative Externalities



When a private transaction imposes costs on society that are not paid by the private transactors, a negative externality exists. With a negative externality, the supply of a product that is provided,  $S_p$ , is greater than it would be if the suppliers had to pay the externality, as shown by  $S_s$ .



**FIGURE 4** Positive Externalities

When a private transaction creates benefits for society that exceed those involved in the private transaction, positive externalities exist.  $D_p$  represents the demand for inoculations against a communicable disease when there is no externality.  $D_s$  represents the demand with an externality. Fewer people get the inoculations than would be desired by society.

equilibrium would have  $Q_s$  getting the inoculations, but the smaller number  $Q_p$  actually do—“too little” of the good is purchased.

### 1.c. Public Goods

An externality exists when some aspects of a transaction are not privately owned but instead spill over to others. When none of a transaction is privately owned—that is, when an item is communally owned—additional problems arise. Again, suppose you have purchased a pizza to be delivered to your house. If you have a well-defined private property right in that pizza, only you can decide who can enjoy the pizza. However, if you do not have a well-defined private property right in the pizza, anyone can simply run over and begin eating the pizza. You can see that if there were no private property rights, no one would spend the money to buy a pizza.

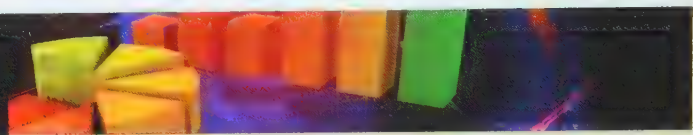
To illustrate why common ownership is a problem, let's consider a situation in which a small village has communal property—everyone owns everything. There are five villagers, and each has \$100. Each villager could use the \$100 to buy a lamb or could deposit it in a bank account and earn \$10 over one year. Lambs are allowed to graze for free on a small grass field called the commons. The free commons means that everyone free rides—everyone uses the commons without paying. The price the lamb will sell for after one year depends on the amount of weight it gains during the year, which, in turn, depends on the number of lambs sent onto the commons, as shown in Table 2.

If just one lamb grazes on the field, it will sell for \$130, a gain of \$30, or 30 percent for the year. This is three times the interest rate earned on the savings. Clearly, one lamb will be purchased and sent out to graze. With two lambs, the sale price is \$120 each, so the total income for each owner is \$20, for a return of 20 percent. With three lambs, the



**5** What are free rider problems?

## GLOBAL BUSINESS INSIGHT



### Why Aren't Cows and Chickens on the Endangered Species List?

There are plenty of cows and chickens—and although they are consumed in huge numbers, their populations are not declining. Other species are experiencing declining numbers. *The Red List of Threatened Species*, compiled by the World Conservation Union, gives details of 11,167 species of animals and plants that are known to be at risk of extinction. Among the 10 animals that are of most concern because of their commercial value is the Hawksbill sea turtle, which is threatened because of the demand for its beautiful shell; the species is the sole source of “tortoise-shell” used to make curios and jewelry. Among the three species of Asian rhinos, the Sumatran rhino is the most threatened, as a result of both habitat loss and poaching for rhino horn, which is used in traditional Chinese medicine. A keystone species for Amazon rain forests, big leaf mahogany, is highly prized for furniture in the United States, which is the world’s leading importer of the wood. Marketed under the more appealing name of “Chilean sea bass,” the toothfish has suffered from its popularity among seafood lovers in the United States and Japan. Yellow-headed Amazon parrots are in demand as pets. There are 32 known species of seahorses, and at least 20 are threat-

ened by the unregulated trade in both live seahorses for aquariums and dried seahorses, which are sold as curios and as treatments in traditional Chinese medicine. Whale sharks are the world’s largest fish—growing as long as 50 feet—and are found in tropical and warm temperate seas. They have been overfished for their meat, fins, liver, cartilage, and skin. The Malayan giant turtle, along with dozens of other Asian tortoises and freshwater turtles, is threatened largely by unsustainable collection for food, primarily in China.

What is the difference between cows and chickens and these endangered species? Private ownership. When a species is privately owned, it will flourish because its owner will ensure that its numbers remain at the level that will earn the owner the most income. When a species is commonly owned—or not owned—no one has an incentive to ensure that the species endures. The command approach defines the endangered species list. Once a species is placed on the list, there are bans on hunting it, fishing for it, or otherwise endangering it. But unless the bans carry huge penalties and are easily enforced, the hunting and fishing will continue.

sale price is \$112 each, so each owner receives a 12 percent return. With four lambs, the return to each owner is the same as the return from putting the money in the bank, 10 percent. And with five lambs, the owners of the lambs are worse off than they would have been if they had simply put the money in the bank. So four lambs use the commons. Each lamb returns \$10 profit at the end of the year. Thus, with \$40 from the lambs and \$10 from interest, the total income of the village is \$50, exactly what it would be if no lambs had been raised and the money had just been put in the bank.

Would things turn out differently if the village charged a fee for using the commons? What is the most that one person would pay to enable her lamb to graze on the commons? The opportunity cost of the \$100 used to purchase the lamb was \$10 (what could have been earned from the bank), so the economic profit from the single lamb is \$20—\$30 from the sale of the lamb minus the \$10 opportunity cost. But with a cost to grazing on the commons, the situation changes. A single commune member would pay no more than \$10 to rent the land, since with that rent the total return is just

$$\$10 = \$30 \text{ from the sale of the lamb} - \$10 \text{ opportunity cost} - \$10 \text{ rent.}$$

At a rent of \$10, just one lamb would use the commons. In this case, total village income would be \$10 from the rent, \$40 from bank interest, and \$10 from sale of the one lamb, or \$60. The benefits to the village have risen from \$50 to \$60 as a result of privatizing the commons.

**TABLE 2** Lambs on the Commons

| Number of Lambs | Price after One Year | Income/Year |
|-----------------|----------------------|-------------|
| 1               | \$130                | \$30        |
| 2               | \$120                | \$20        |
| 3               | \$112                | \$12        |
| 4               | \$110                | \$10        |
| 5               | \$109                | \$ 9        |

When the “commons” are owned—when there are private property rights—utilization is reduced, and the benefits to society rise. The problem with communal property is that everyone free rides; no one takes into account the costs that each additional user imposes on others. When no one owns the fish in the sea, or no one owns the elephants that roam the African plains, or no one owns the American buffalo or bald eagle, or when no one owns the forests, a “too rapid” rate of use or harvest occurs; the “commons” is overutilized.

Common ownership fails to create an incentive for people to produce and consume the amount that is best for society. This is why communism failed. Under communism, no one has a private property right to anything, including his or her own labor. As a result, no one has an incentive to improve his or her human capital—to increase the value of personal skills and training—and no one has an incentive to ensure that companies are run efficiently. In China prior to 1990, people could not own the apartments in



The tragedy of the commons is the name given to the problem created when something is owned commonly rather than privately. Fish, for instance, are overfished because no one owns them. Because there are no private property rights, everyone can catch the fish and no one has an incentive to ensure that enough fish are left to propagate. If the beach is a commons, then anyone can use it and abuse it.



which they lived. All urban living took place in government-owned buildings. Since no one had a private property right to a home, no one had an incentive to take care of it. The buildings were dilapidated, the hallways were filthy, and the landscaping was nonexistent. When the Chinese leaders allowed some private ownership of apartments, those that were privately owned immediately became much improved. The hallways became clean, the landscaping reappeared, and the apparent quality of the buildings changed virtually overnight.

## RECAP

1. An externality occurs when the costs and/or benefits of a private transaction are borne by those who are not involved in that private transaction.
2. A positive externality is a situation in which a private transaction creates benefits for members of society who are not involved in the transaction. In the case of positive externalities, not enough of the good or service is produced and consumed.
3. A negative externality is a situation in which a private transaction creates costs for members of society who are not involved in the transaction. In the case of a negative externality, too much of the good or service is produced and consumed.
4. Private property rights enable someone to own an item, that is, to dispose of, destroy, share, give away, or do anything that the person wants with the item.
5. When there are no private property rights to an item, that item cannot be bought or sold. No one has an incentive to produce the item or to purchase it.
6. When something is commonly owned, that something is overutilized.
7. A public good is one for which the principle of mutual excludability does not hold; when one person uses the item, that use does not reduce the quantity available for others.
8. Since a public good can be used without paying for it, people have no incentive to purchase it. A free rider problem arises.
9. A free rider problem occurs when someone can contribute less to an activity than that person can get back in return because that person relies on others to make up the difference. The problem is that if many people free ride, the item or activity is not produced.

## 2. Solutions to Market Failure

The solution to the lack of private property rights seems pretty straightforward: Create and enforce private property rights. For instance, in many nations in which elephants reside, no one owns the elephants. The result is that they are *overutilized*—they are becoming extinct. In most nations with elephants, large national parks have been created in which hunting is forbidden. But even in the face of these bans on hunting, the reduction in the number of elephants has continued. A decade ago, Africa's elephant population was more than a million; it has now fallen to less than half of that. In contrast to the common ownership strategy, the governments of Botswana, Zimbabwe, and South Africa created private property rights by allowing individuals to own elephants. These elephant farmers ensure that the elephants breed and reproduce so that they can be sold for their tusks, for hunting in special hunting parks, or to zoos in developed nations. This has led to a revival of the elephant population in these nations.

Sweden and Finland have more standing forest today than at any time in the past. Unlike the situation in Canada, where the forest is dwindling, most of the forest land in Sweden is privately owned. Private owners do not cut at a loss and do not cut to

maintain employment levels or other political reasons. They cut at the rate that yields them the greatest return. If they simply razed their forests, they would have no income in coming years. So they cut or harvest at rates that ensure viable populations.

## 2.a. Government's Role

If all the costs or benefits of a private transaction belonged to the people creating them, then externalities would be no problem. When the people causing externalities pay for them, we say the externality has been **internalized**. Many people argue that it is the government's responsibility to reduce the externality problem: Just as it is the government that must assign and enforce private property rights in many cases, it is the government that must force the internalization of externalities. If so, how can the government get the externalities to be internalized?

### internalized

When external costs or benefits are borne by the transactors creating them.

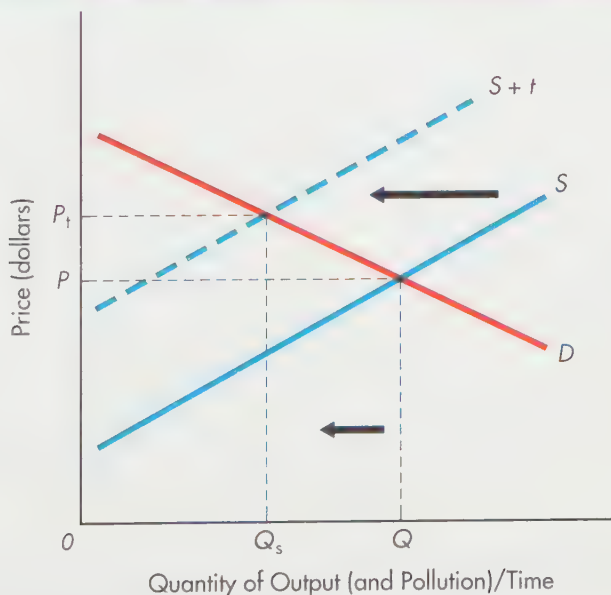
**2.a.1. Tax or Subsidize the Externality** Suppose a firm pollutes as it creates its good. If the government imposed a tax on that company based on the amount of pollution the firm created, the firm would have to consider the extra cost when deciding whether to increase its output (and thereby pollution). This is shown in Figure 5 as the supply curve  $S + t$ , the supply curve plus the tax. The tax reduces the amount produced from  $Q$  to  $Q_s$ , and thereby reduces the amount of pollution created by the firm. The tax is a way in which the government can force the polluter to *internalize* the externality—that is, to pay for it rather than have society pay for it.

The firm could avoid the tax by either reducing the amount it produces or purchasing pollution abatement equipment—equipment that will reduce the amount of pollution created. With less pollution, the firm will pay fewer taxes. Either choice, paying the tax or buying the equipment, means that the externality is internalized by the firm.

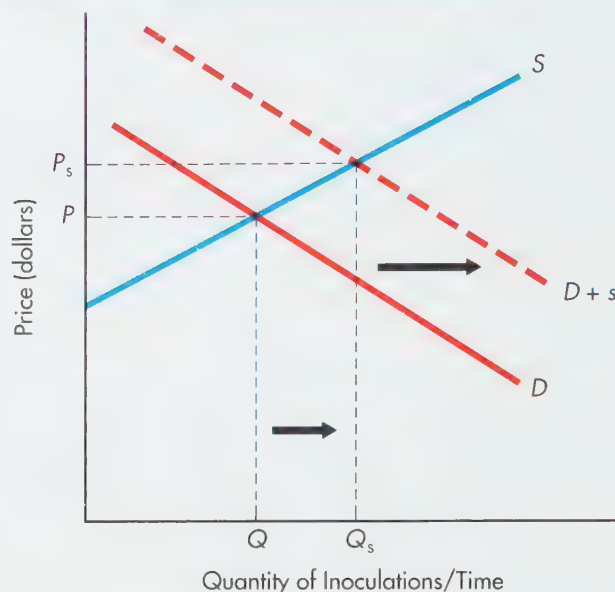


- 6 How does the government solve externality and free rider problems?

**FIGURE 5** Pollution Tax



A tax on a firm that creates a negative externality reduces the quantity supplied and thus forces the firm to internalize the externality.  $Q_s$  is produced rather than  $Q$ .

**FIGURE 6** Subsidy

A subsidy to people getting inoculated increases the demand for inoculations, leading to more inoculations being obtained,  $Q_s$ .

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In the case of a positive externality, the government might provide a subsidy rather than impose a tax. Suppose each person getting an inoculation is given some money. More people would be willing to be inoculated, as shown in Figure 6. The subsidy,  $s$ , induces buyers to increase the quantities that they are willing and able to buy at each price. The total amount produced and consumed rises from  $Q$  to  $Q_s$ .

**2.a.2. Command and Control** Rather than imposing a tax, the government could simply require or command that the company not create waste. For instance, the government could tell a copper mining operation to produce no more than three gallons of waste per ton of copper. The firm will then have no choice; it will have to either reduce the amount of waste it produces or go out of business. However, the command approach provides no incentive for the firm to utilize any new technology that might reduce waste beyond the mandated amount.

With a positive externality, the government might dictate who must use or consume the beneficial activity. For instance, by mandating that all children under the age of six be inoculated, the government is using a command approach: It is forcing the children to be inoculated. But by forcing everyone to be inoculated, the government is not selecting the socially optimal amount of inoculations. As a result, more than the socially optimal number of people get inoculations, and the costs of the inoculations are higher than would be necessary.

**2.a.3. Marketable Pollution Permits: Cap and Trade** Governments have attempted to establish a market for the right to create some externalities, such as air pollution. The government specifies that a certain quantity of pollutants will be permitted in a particular area. It then issues permits that enable the owners of the permits to pollute. For example, if the target pollution level in the Los Angeles basin is 400 billion



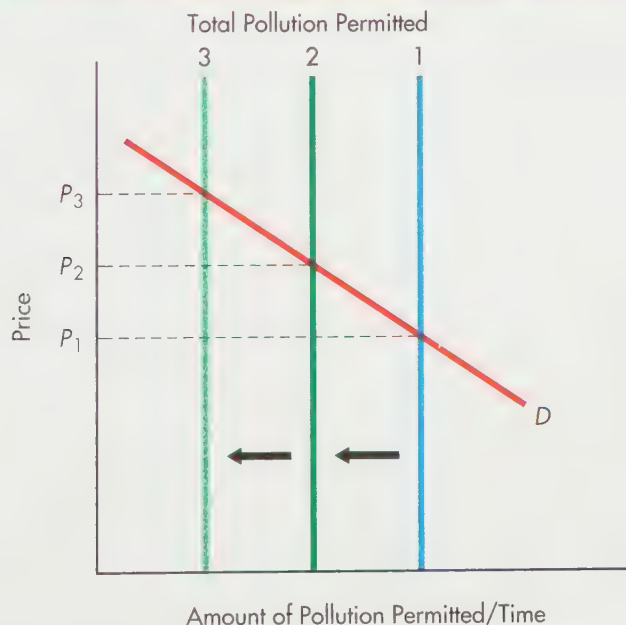
particulates per day, the government could issue a total of 400 permits, each allowing the emission of 1 billion particulates per day. Then the government could sell the permits. Demanders, typically firms, would purchase the permits, allowing them to pollute up to the amount specified by the permits they own. If a firm purchased 20 permits, it could emit up to 20 billion particulates per day. If that firm implemented a cleaner technology or for some other reason did not use all of its permits, it could sell them to other firms.

The marketable permit idea is illustrated in Figure 7. The pollution target or cap set by the EPA is indicated by the vertical supply curve for pollution rights in Figure 7 labeled “1.” The demand for permits to pollute is shown by the downward-sloping demand curve,  $D$ . With a price,  $P_1$ , for pollution rights determined, firms choose whether to pollute the amount they have purchased, to not produce as much and sell the excess permits, or to adopt cleaner technology and thus be able to sell the permits they don’t use.

If the government decides to reduce pollutants more than it has in the past, it will reduce its pollution target. This is shown in Figure 7 as an inward shift of the total pollution permitted line. Demanders will bid for the now fewer pollution permits, driving the price of the permits up. As the price rises, some firms will decide not to purchase the permits, but instead to purchase new pollution abatement equipment or to reduce the amount they produce. The higher price gives firms an incentive to adopt more efficient pollution abatement equipment.

The permit market also enables others to influence the total amount of pollution created. Anyone can purchase permits. Some environmental groups, such as the Nature

**FIGURE 7** The Market for Pollution Permits



The government establishes the amount of pollution to be permitted. It then issues permits, each allowing a certain amount of pollution. To be able to pollute, a firm, individual, or group must have a permit. Holders of permits and those wanting permits then trade. The price of permits is determined by demand and supply. As the government reduces the amount of pollution allowed, the price of the permits increases.

Conservancy and the Sierra Club, have purchased permits simply to reduce the total amount of pollution that can occur in a specific area or industry. By purchasing the permits and taking them out of circulation, they essentially reduce the total number of permits and the total amount of pollution permitted.

## RECAP

1. Government intervention to resolve the lack of private property rights include tax and subsidy, command and control, trade and cap, and assignment of ownership.

## 3. New Market Failure Arguments

Until the latter part of the twentieth century, market failure arguments were based on the lack of private property rights as exemplified by public goods, commons goods, and externalities. A general consensus developed in the economics profession that governments should intervene in a few markets to solve market failures, but that in most markets failures did not occur. This consensus began changing in the 1970s and 1980s as economists developed new market failure arguments based on the idea that there were information imperfections in markets. It was argued that these imperfections led to market failures as people made decisions on faulty or limited information. With this new approach, it seemed market failures occurred everywhere.



- 7 What are moral hazard and adverse selection problems?

### asymmetric information

When the parties to a transaction do not have the same information about the transaction.

### adverse selection

The situation in which higher-quality goods, consumers, or producers are driven out of the market by lower-quality examples because of limited information about the quality.

### lemons market

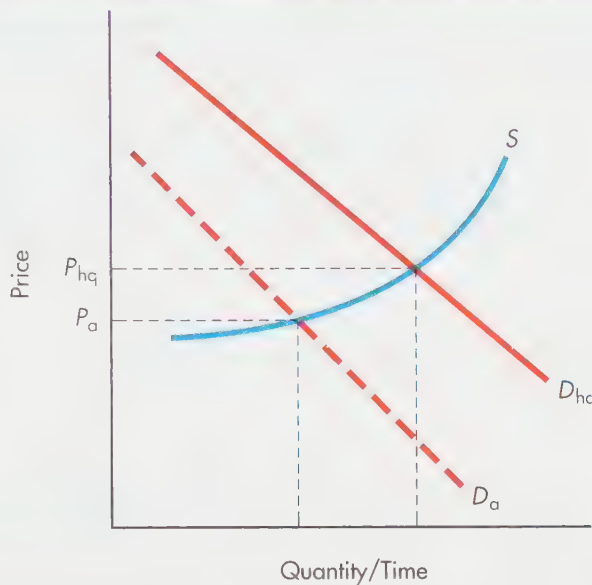
Market in which adverse selection occurs.

### 3.a. Asymmetric Information

When one party to an exchange knows a lot more about the good or service than the other party, the knowledgeable party may take advantage of the less-informed party. This is the problem of **asymmetric information**. When you purchase a used car, you are probably unsure of the car's quality. Most people assume that cars offered for sale by private individuals are defective in some way, and they are not willing to pay top dollar for such a car. In Figure 8, the market for high-quality used cars and that for low-quality used cars is shown. People offer their cars for sale as shown along the supply curve. Although demand for high-quality used cars would be  $D_{hq}$  if demanders could differentiate high-from low-quality used cars, the actual demand is  $D_a$ . Thus, people who do have high-quality used cars for sale cannot obtain the high price that they deserve. The result is that low-quality cars continue to be sold in the secondhand market, but high-quality cars do not. This result of the good being driven out of a market by the bad is called **adverse selection**. A market in which adverse selection occurs is often referred to as a **lemons market**, based on the idea of the used car being a lemon.

Adverse selection can occur in many different markets. For instance, banks do not always know which people who are applying for loans will default and which will pay on time. What happens if a bank increases the interest rate it charges on loans in an attempt to drive high-risk applicants out of the market? High-risk applicants continue to apply for loans because they don't have other alternatives that are less expensive. But low-risk applicants have other sources for loans, and so they stop applying to this bank. As a result, only high-risk applicants remain in the market.

People purchase automobile or health insurance even if they are excellent drivers and enjoy good health. However, as the cost of insurance rises, the good drivers and healthy people may reduce their coverage, while the poor drivers and unhealthy people maintain their coverage. As a result, high-risk applicants take the place of more desirable low-risk applicants in the market for insurance.

**FIGURE 8** Adverse Selection

High-quality cars should be priced at  $P_{hq}$ . Because potential buyers cannot distinguish between high- and low-quality cars, the actual price of high-quality cars is  $P_a$ . The result is that only low-quality cars remain in the used car market.

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Another problem that can arise in markets when information is imperfect is called **moral hazard**. When you enter into an agreement you can have secure private property rights to the agreement only if the other parties do not change their behavior. A person who drives much less carefully after obtaining car insurance is creating a moral hazard. A person who takes less care to be healthy after obtaining health insurance is creating a moral hazard. The incentive for creating a moral hazard arises because the person buying the insurance knows more about his behavior than the insurance company does. These information imperfections lead to market failure.

#### **moral hazard**

The problem that arises when people change their behavior from what was expected of them when they engaged in a trade or contract.

### 3.b. Solutions to Adverse Selection and Moral Hazard

How can you be assured that the used car you are buying is high quality? How can you be sure the food and drugs you purchase are high quality? Many argue that you cannot, and that this is why government rules and regulations are necessary. The Federal Trade Commission restricts advertising, requiring that claims be demonstrable. Many governments require a time period after an exchange has occurred during which the buyer can change her mind; if before two days are up I decide that I don't want the product, I can return it and get my money back. In the case of insurance and loans, government rules and regulations indicate who is eligible for loans and whether different customers can be charged different rates. Governments ban certain ingredients in foods, such as trans fats, or regulate the quality of food and products, because consumers have less information about these foods than do the producers. The Food and Drug Administration inspects foods and drugs because producers have much more information about the foods and drugs than do consumers. Ingredients have to be listed on the packaging for foods and drugs. Government rules and regulations are used to minimize adverse selection and moral hazard.



## RECAP

1. Adverse selection occurs when buyers have less information than sellers; a situation can arise in which high-quality products are driven out of the market, leaving only low-quality products.
2. Moral hazard occurs when one party in a transaction alters his behavior with regard to that item once he has purchased it. For instance, once someone is insured, that person may act differently, undertaking more risk.
3. The government is often called upon to intervene by requiring that information be provided or by subsidizing the activity in which a moral hazard exists.

## 4. Increasing Returns and Network Externalities

Another market failure argument based on information imperfections claims that the economy is a “winner takes all” world. The first firm to gain market share drives all others out; the richest person gets richer and others do not; inefficient technologies keep efficient ones out of the market.

### 4.a. Diminishing and Increasing Returns

When a firm has a building and equipment and alters short-run supplies by increasing or decreasing the number of employees, the first few employees each generate increasing amounts of additional output. Eventually, however, another employee adds to output but less than previous employees did. As additional employees continue to be added, the additional output added continues declining. As we know from the chapter on “Supply: The Costs of Doing Business,” this is called diminishing marginal returns. You can’t keep adding more and more labor to a fixed amount of capital and land and expect that the labor will continue to be more productive.

Suppose, however, that new technology enables more employees to work out of the office without any loss in productivity. The new knowledge alters the fixity of capital and land, which in turn alters diminishing marginal returns. If the knowledge factor changes each period, then each additional worker is adding increasing amounts of additional output rather than decreasing amounts. This is called **increasing returns**.

The comparison of increasing returns and diminishing returns is illustrated in Figure 9. The point at which diminishing returns would set in if capital remains fixed doesn’t occur when capital is embellished by new knowledge. The implication of increasing returns is that the bigger a firm becomes, the larger it is still likely to become. The more of something there is, the more valuable each additional one becomes. So if the world is one of increasing returns, a monopoly is likely to control each market. This has been called a “winner takes all” world.

#### increasing returns

Each additional resource adds increasing additional output.



#### 8 What are network externalities?

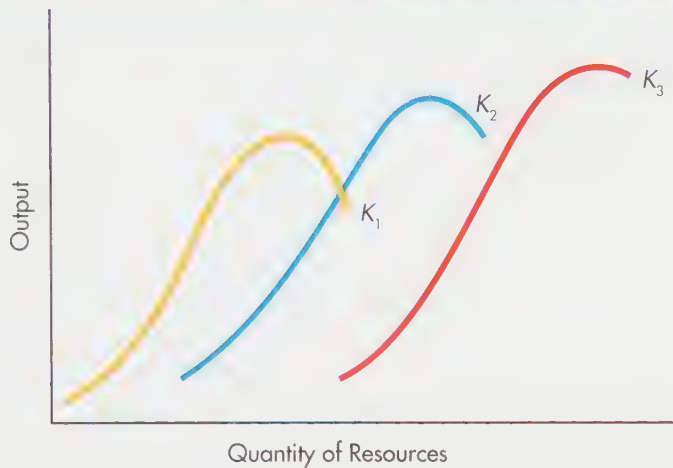
#### network externalities

Each additional user increases value of entire network.

### 4.b. Network Externalities and Lock-In

A related aspect of the knowledge economy leading to potential market failures is **network externalities**.

The idea of a network can be illustrated by comparing fax machines to refrigerators. The first refrigerator provided great value to the owner. The second refrigerator provided value to the owner but had no effect on the owner of the first refrigerator. On the other hand, the first fax machine was worth little because there was no one to send a fax to. The second fax machine made the first one more valuable. Each additional

**FIGURE 9** Increasing and Diminishing Returns\*

Combining additional resources with a fixed amount of capital eventually leads to a decline in the productivity of the resources. This is diminishing returns and is shown as the curve labeled  $K_1$ . If that capital is increased as well, then adding more resources with that capital need not cause diminishing returns. It could cause productivity to rise. This is increasing returns, shown as the shifts to curves labeled  $K_2$  and  $K_3$ .

fax machine sold added value to every fax machine sold before it, because it increased the network of fax machines. An externality is provided to all other machine owners when someone purchases a machine. And, therefore, like a snowball rolling down a snow-covered hill, the bigger the snowball is, the bigger it gets. As more of us bought fax machines, more of us wanted fax machines—to communicate with those who already had them.

Suppose that the value of a network to each individual member rises as the number of members rises. Specifically, suppose that value is proportional to the number of users that can interconnect, so that if there are  $n$  users, the value of the membership is proportional to  $n(n-1) = n^2 - n$ . If the value of a network to a single user is \$1 for each other user on the network, then a network of size 20 has a value of  $(20 \times \$20) - 20 = \$380$ , whereas a network of size 200 has a value of  $(200 \times \$200) - 200 = \$40,000 - \$200 = \$39,800$ .

In this numerical example, the value of the network increases exponentially as users increase linearly. If this situation does characterize a network, it implies that it would be difficult for a small network to survive. For the same cost of connection, would a user choose the smaller, 20-person network or the larger, 200-person network? Clearly, a new member would choose the larger network. Another aspect of a network is that it is difficult (costly) for a member to switch to another network. The cost for any one individual user to switch to another network (the opportunity cost of not being connected to the large network) increases the larger the network. As a result, it would seem that one network would dominate—that there would be a winner takes all.

One example widely used to support the winner takes all argument is the typewriter keyboard, presented in shorthand as QWERTY. The first letter line on a computer keyboard is QWERTYUIOP, or QWERTY for short. According to many economists, it is not the most efficient layout in terms of finger movement. Manufacturers designed a layout that forced typists to work more slowly because of the tendency of keys to jam on

**locked in**

The cost of changing to a more efficient technology is higher than the benefit.

early typewriters.<sup>4</sup> But several decades ago, jamming keys was no longer a problem, and it would have made sense to shift to an alternative, more efficient design. A rival layout, called the Dvorak keyboard, was available and purportedly more efficient. But the standard keyboard was a network that had become **locked in**. People who learned on the old keyboard were not about to change to a new one.

The QWERTY story shows us that markets are not likely to lead to the adoption of the most efficient technology. There is a *path dependence* to technology; once some historical accident or random event favors some technology, it becomes the standard and used thereafter *even if it is not the most efficient*. The QWERTY story is used to explain why VHS is used rather than the *superior* Beta; why Windows is used rather than the *better* Mac system; why gas-powered automobiles are used rather than the *better* steam-powered ones; and why light-water nuclear power plants are used rather than the *better* inert gas nuclear power plants. All these examples are used to support the general view that free markets cannot be relied on to select the best technology. “In a QWERTY world, markets cannot be trusted,” says Paul Krugman, 2008 Nobel Laureate.<sup>5</sup>

The argument is that market winners will only by the sheerest of coincidences be the best of the available alternatives.<sup>6</sup> The first technology that attracts development, the first standard that attracts adopters, or the first product that attracts consumers will tend to have an insurmountable advantage, even over superior rivals that happen to come along later. According to this argument, if DOS is the first operating system, then improvements such as the Macintosh will fail because consumers are so locked in to DOS that they will not make the switch to the better system. The success of Windows-based computers, in this view, is a tragic piece of bad luck.

It is argued that to avoid the winner-takes-all result, the government must ensure new entry and limit the size of networks. Government has to offset increasing returns. Some economists have argued that confiscating taxes on the “winners” is necessary to ensure people don’t keep running on a treadmill trying to “keep up with the Joneses” when it is impossible to do so.<sup>7</sup>

## RECAP

1. Diminishing returns occur when each additional worker added to a fixed capital and land stock adds diminishing marginal output. Increasing returns occur when each additional worker is adding increasing amounts of additional output. New knowledge may create increasing returns.
2. Network externalities occur when each additional user or member of a network increases the value of entire network.
3. As a result of increasing returns and/or network externalities, it would seem that one network or one technology would dominate—that there would be a winner takes all.
4. There is a *path dependence* to technology; once some historical accident or random event favors some technology, it becomes the standard and is used thereafter *even if it is not the most efficient*.

<sup>4</sup> This question was first asked by Paul David (1986) “Understanding the Economics of QWERTY: The Necessity of History,” in W. N. Parker (ed.), *Economic History and the Modern Economist*, Basil Blackwell.

<sup>5</sup> Stan Liebowitz and Stephen E. Margolis, “The Fable of the Keys,” *Journal of Law and Economics*, Vol. 33, April 1990, p. 1; *Reason*, June 1996, Vol. 28, No. 2, p. 28.

<sup>6</sup> See *The Winner-Take-All Society: Why the Few at the Top Get So Much More Than the Rest of Us*, by Robert H. Frank and Philip Smith, New York: Penguin (September 1, 1996).

<sup>7</sup> *Ibid.*



## 5. The Market Does Not Fail

The market fails when there is a lack of well-defined private property rights. Many economists argue that when the market fails, the government must step in. Some economists argue that the market does not fail, that private individuals and free markets can solve problems that appear to be market failures.



**9** Is government intervention necessary or justified to solve market failures?

### 5.a. There Are Externalities Everywhere

The externalities argument is based upon a distinction between private goods and services (the use of which benefits only the consumer in question) and public or collective goods (consumption of which necessarily affects the “external” parties). The distinction is often made in terms of excludability. In the case of private goods, the consumer is able to exclude all others from the benefits. In the case of public goods, everyone cannot be excluded, so some of the benefits spill over onto third parties.

One argument against government intervention to resolve externalities is that it is impossible to find cases in which externalities do not appear. Take, for example, socks. They are a private good. Yet people who do not wear socks are liable to get colds, sore feet, blisters, and possibly pneumonia, and sickness means lost days of work and lost production; it means possible contagion; it may result in rising doctor bills and increased health insurance premiums for other policyholders. Increased demand for doctors’ time and energy will result in reduced medical attention for others. There is, in addition, the problem that many people are offended by socklessness—that is why we see “no shoes no service” signs.

Or consider a private garden. Suppose you love gardening and have created a magnificent garden in the front of your house. People walking by can enjoy the garden for free; conversely, a few might be allergic to the flowers and bear the cost of sneezing, for which they will not be compensated. You do not own either their enjoyment or their disutility; it is an externality you create with the garden.

When you go to the supermarket to buy groceries, you run across all kinds of externalities. You are able to purchase your favorite cereal because others have purchased it, inducing the store to stock it for your benefit. When you get in line at the checkout counter, you impose a waiting cost on everyone behind you. Why don’t you turn around and offer to compensate those behind you? Why don’t those enjoying your garden offer to compensate you for creating it? It is not worth the costs.

**5.a.1. Coase** If every transaction creates externalities, there is no basis for government intervention in selective cases. When a problem is important to people, they will solve it. Nobel Laureate Ronald Coase was the first to point out that if people can negotiate with one another over the right to perform activities that cause externalities, they will arrive at an efficient solution.

To illustrate Coase’s intuition, consider the following situation. Suppose that a city has a noise ordinance forbidding the operation of lawnmowers and leaf blowers prior to 8 a.m. on Sunday mornings. Neighbor Ralph ignores the ordinance and mows and blows his lawn every Sunday morning, which neighbor Louis finds increasingly irritating. The noise ordinance gives Louis the right to demand that Ralph be quiet. So Louis could call the cops and require Ralph to obey the ordinance. If Ralph has no other time when he can mow the lawn, he might try to pay Louis to allow him to mow on Sunday morning.

Suppose there was no city noise ordinance. Then Louis could not demand that Ralph be quiet. Instead, Louis might pay Ralph not to start mowing until after 10 a.m. This is the point that Coase made: If ownership is established—that is, if private property

rights are well defined and enforced—private parties can negotiate a solution to the externality problem. The solution will make both parties happy—one receives money, and the other receives the right to make noise or to obtain quiet. If negotiation is possible, then resources will be allocated to their highest-valued use even if an externality should occur.

A motorist with a polluting automobile imposes costs on everyone who breathes the air, but as a practical matter, all these people can't stop the motorist and offer him money to fix his car, and the motorist surely cannot contact everyone touched by the pollution. The **transactions costs** are too high for negotiation to occur. But this does not necessarily call for government action. If transactions costs are too high, perhaps they can be reduced by forming smaller groups and through voluntary actions. People could agree to binding pledges to contribute to building a public good as long as enough others do also. If not enough people contribute, the money is refunded. This could be done by a profit-seeking entrepreneur who could provide the good for a profit by selling shares in the public good. He could create a contract to provide the good with a promise to refund the initial pledge plus an additional sum of money if not enough people sign up. A similar alternative for public goods is to produce the public good but refuse to release it into the public until some form of payment to cover costs is met. Stephen King wrote several chapters of a novel and made them downloadable for free on his website; but he would not complete the story unless a certain amount of money was raised.

It is possible that voluntarism could overcome transactions costs. A free rider might litter in a public park, but a more public-spirited individual would not do so, getting an inherent pleasure from helping the community. People might voluntarily pick up some of the existing litter. Isn't this arguing that people will act against their self interest? It is not, because people often get enjoyment out of volunteering. In some cases, a social stigma develops regarding some action, such as littering. If you throw trash out of your car, others might honk at you, give you obscene gestures, or even collect your litter and send it in the mail to you. If enough people begin doing something, that behavior becomes the expected, socially correct way of behaving. Think, for instance, why people leave a tip at a restaurant when they do not plan on ever returning to that restaurant. It is not simply to provide income to poorly paid servers or to reward good service, but instead, it is to avoid feeling guilty, a reaction to going against a social stigma.

Contributions to online collaborative media, such as Wikipedia and other projects utilizing wiki technology, represent an example of voluntary contributions, because they provide a public good freely to all readers.<sup>8</sup> Wikipedia has millions of contributors with billions of contributions. Something so large would seem to require managers, budgets, hierarchy, and so on. However, Wikipedia is able to aggregate hundreds of millions of contributions without the traditional business infrastructure. The contributors are not employees and do not get paid. Their incentive is to interact with others and to see their work spread. Each contribution does not need to be competent, because other readers will improve the initial work until the end result is high quality. A bad article will be rewritten and essentially disappear as improvement on it takes place. With current and future technologies, the ability to attract voluntary action to a public good seems to be more likely. Thus, according to many economists, although free riding does identify situations that involve the potential for further gains, it does not follow that government provision of goods or other coercive arrangements will improve the situation.

## 5.b. Imperfect Information

The idea that information was important to markets was not new to the economists of the 1970s and 1980s. The Austrian school—economists working in Austria in the 1930s—stressed that imperfect information and dispersed knowledge were fundamental

### transactions costs

The cost of carrying out a transaction.

<sup>8</sup> Clay Shirky, *Here Comes Everybody*, New York: Penguin Press, 2008.

arguments for the necessity of free markets. They noted that the market process—countless individuals pursuing their own interests by trading with one another—is a path of discovery. Through the price system and free competition, the tradeoffs of scarce resources are clarified, the lowest-cost solutions are reached, and feedback about success and failure are provided through profit and loss. When people buy something, they are showing they value the item they purchase more than anything else a comparable amount of money could buy. Similarly, when people sell something, they are showing they would rather have the money price of that item than they would the item. They value something else more than what they are selling. So when buyers and sellers agree to exchange some item, the price of the item is the result of the buyer saying that the item has more value to him than the money price while the seller simultaneously says the item has less value than the money price.

The market price incorporates all the information—the trillions and trillions of bits of information—involved in buyers' and sellers' tastes, preferences, beliefs, and expectations. If the buyer learns something new about the item—say, that it has more uses than was previously known—the buyer will immediately be willing to pay a higher price. The new price incorporates the buyer's newfound information. Similarly, if the seller learns that the costs of an important resource are going to increase, the seller will cut supply or require a higher price to supply. The market price rises to reflect the increased costs of resources. The market does this without anyone dictating what buyers and sellers do or defining the price at which trade will occur.

Nobel Laureate Friedrich A. Hayek attacked central planning and socialism because of the information gathering power of the free market. Central planning didn't and doesn't work for nations. The central planners could not possibly know what price to set on items to be traded. It would be impossible for the central planners to collect all of the information that the anonymous buyers and sellers in a market have. As a result, the price set by the planners is either too high or too low, resulting in shortages of some items and surpluses of others. Simply stated, there is too much information for a central planner or government to determine price and quantity. It takes the invisible hand of the market to determine the price and quantity necessary for efficient resource allocation.

The economists emphasizing information imperfections in the 1970s and 1980s argued that the imperfections caused markets to fail, as opposed to Hayek's view that imperfect information is what makes markets necessary. In essence, the new market failure arguments turned Hayek's insight on its head. Information problems were a cause of market failure rather than a reason for praising markets. Although the *new* market failure arguments introduced new aspects to the economic debate, not all economists were swayed.

**5.b.1. Market Solutions to Moral Hazard** Moral hazard is a form of externality. Moral hazard arises because an individual or institution does not bear the full consequences of its actions, and therefore has a tendency to act less carefully than it otherwise would, leaving another party to bear some responsibility for the consequences of those actions. Sometimes a moral hazard problem can be reduced by having the person or firm creating the hazard and the person or firm being taken advantage of share in the costs. This does not require government interference, but instead will arise because the companies subject to moral hazard want to minimize the cost. Insurance companies require a **deductible**, and banks and other lending institutions require a down payment to ensure that the company and the customer share in the expenses and risks. You are more likely to drive carefully and safeguard your health if you have to pay some of the costs of an accident or illness. Similarly, if you must make a **copayment**, you are less likely to behave in a way that causes you to bear a large number of such copayments.

#### **deductible**

The amount of expenses that must be paid out of pocket before an insurer will cover any expenses.

#### **copayment**

Paid by an insured person each time the insured service is accessed.



**5.b.2. Market Solutions to Adverse Selection** Why can't someone with a high-quality used car simply tell the buyer about the car's condition? The reason is that the seller has an incentive to exaggerate the condition of the car, and the buyer has an incentive to believe that it is of lower quality than it is, which leads to adverse selection. The problem can be resolved privately if the seller can credibly demonstrate the high quality of the car. A seller must provide credible information about the quality of the good. When moral hazard or adverse selection exists, there may be an opportunity for someone to profit from providing information. CAREAX provides the history of a car for a fee. Equifax provides individual credit histories for a fee. These firms illustrate that the market can often solve what is called a market failure problem. When the missing information can be privately provided, the market failure problem disappears.

**5.b.3 Market Solutions to Path Dependence and Lock-In** Many economists argue that if the government does not intervene when increasing returns and network externalities exist, an inefficient technology is likely to dominate markets. Other economists oppose this view, arguing that as long as there is a profit opportunity, people will find a way to offset the increasing returns. Remember QWERTY, the keyboard configuration that many people called inefficient? According to some economists, the QWERTY story is wrong.<sup>9</sup> QWERTY was not an inferior structure designed to slow down typing; there were many competitive systems offered on typewriters in the 1880s and 1890s, but none could perform better than the QWERTY system.

So it is not correct to claim that QWERTY illustrated a case of inefficient lock-in. Similarly, to accept the idea of inefficient lock-in regarding DOS and Windows, we need to ignore the fact that DOS was not the first operating system, that consumers did switch away from DOS when they moved to Windows, that the DOS system was an appropriate choice for many users given the hardware of the time, and that the Mac was far more expensive. Many people are switching from Windows to Mac, and the two systems are becoming compatible.

## RECAP

1. Adverse selection and moral hazard problems are often resolved privately through copayments, deductibles, and other arrangements that reduce the incentives to change behavior or not reveal information.
2. If there is a profit opportunity to provide information, it will be provided. There is no reason to think that imperfect information necessarily leads to a market failure.

## 6. Government Failure and Rent Seeking

Economists have pointed to several possible types of market failure. For each, there are usually two types of solutions proposed—government intervention or a private solution. Whereas it is one thing to argue that a market failure cannot be resolved privately, it is quite another to argue that the inefficiency created by the failure is worse than the inefficiency of having the government try to solve the problem. At least, this is what James Buchanan, who received the 1986 Nobel Prize in economics, argued. Inefficiencies often arise not because legislators are incompetent or ignorant, but because of problems with individual incentives.

<sup>9</sup> See Stan Liebowitz and Stephen E. Margolis, "The Fable of the Keys," *Journal of Law and Economics*, Vol. 33, April 1990, p. 1; Reason, June 1996, Vol. 28, No. 2, p. 28.

## 6.a. Logrolling and Pork

Consider a group of diners who are going to split the bill for the dinner equally. Herb and nine friends are having dinner at Chimichanga in Phoenix. To simplify the task of paying for their meal, they have agreed in advance to split the cost of the meal equally, with each paying one-tenth of the total check. Herb recognizes that if he orders more expensive items than the others, he will be gaining at the expense of his nine friends. So he orders appetizers, the most expensive entrée, and the most exorbitant dessert and drinks. The problem is that each of his nine friends recognizes the same thing. Each orders far more than he would if he were dining alone. As a result, the total bill rises.

This is the way democratic government works. Legislators will support one another's special earmarks, or so-called pork barrel programs, causing total government spending to rise significantly. Why would legislator A support such a project in legislator B's home district? After all, B's project will cause A's constituents' taxes to rise by a small amount, while they get absolutely no benefit. The answer is that if A does not support B's project, then B will not support A's. The practice of legislators supporting one another's projects is called **logrolling**.

### logrolling

An inefficiency in the political process in which legislators support one another's projects in order to ensure support for their own.

Beyond the fact that the legislative process often results in pork barrel programs, we must worry that government employees may not have incentives to get the most for what the government spends. Since the government is not a profit-maximizing entity, it has no incentive to minimize costs. Instead, what often occurs is bureaucracy building. An agency director will have more say in policy if her agency is large than if it is small. So she may have an incentive to increase the spending, and therefore the size, of her agency. And whereas an appointed government official might engage in bureaucracy building, an elected official wants to get reelected. That might mean supporting special-interest projects in order to secure votes, even if those projects are inefficient.

## 6.b. Rent Seeking and the Power of Organized Interests

Consider a voter in a congressional district that contains one one-hundredth of the country's taxpayers. Suppose that district's representative is able to deliver a public project that generates benefits of \$100 million for the district, but costs the government \$150 million. Because the district's share of the tax bill for the project will be only \$150 million/100 = \$1.5 million, residents of the district are \$98.5 million better off with the project than without it. And that explains why so many voters favor legislators who have a successful record of "bringing home the bacon."

When a new government project is financed, a very few people get large benefits, while the taxpayers pay an only slightly larger amount in taxes. This means that individual taxpayers have little at stake and therefore have little incentive to incur the cost of mobilizing themselves in opposition. **Rent seeking** is the process of devoting resources to taking wealth away from one group in order to benefit another group. Resources devoted to getting the government to provide benefits to special interest groups are called *rent*, and the special interest group is said to be *rent seeking*.

Rent seeking is a very rewarding activity in many cases. Rent seeking does not create new products or income; it merely transfers wealth from one group to another. Typically the transfer takes resources from large, diverse groups, like taxpayers, and gives them to small, organized groups. This means that the beneficiaries have an incentive to organize and lobby in favor of their projects. For example, in the 1990s, the Cosmetology Association in many states lobbied the state legislators to require more stringent licensing requirements for manicurists. The reason for the lobbying was the number of new spas and salons that were being established by immigrants. These spas were driving prices down; some of them were offering manicures for \$10 rather than the \$25 charged at

### rent seeking

The use of resources simply to transfer wealth from one group to another without increasing production or total wealth.

the established spas. If manicurists were required to go to school for six months, the number of new spas that would open for business would decline, and prices at established spas could be upheld. The new requirements benefited the existing cosmetologists at the expense of new manicurists.

## SUMMARY

### 1. What are the benefits of free markets?

- The index of economic freedom is highly correlated with standards of living. The greater the economic freedom, the higher the nation's standard of living. *Preview*
- The index of economic freedom is correlated with the United Nations index of human development. Prosperity of economic freedom enables people to purchase a higher quality of living. *Preview*

### 2. How are private property rights defined?

- A property right is the right to ownership, to do what you want with what you have as long as you don't harm others or interfere with the private property rights. §1.a
- A market failure occurs when the market is not able to reach the equilibrium that is most efficient, when resources are not allocated to their highest-valued use. §1.a
- Private property rights provide ownership. In order to buy or sell something, one must be able to decide how that something is to be used. §1.a
- Without private property rights, anyone can claim partial ownership of an item and thereby consume that item. Without private ownership, no one would be willing to purchase an item, because others could consume that item. §1.a

### 3. Why does a lack of private property rights lead to market failures?

- A freely functioning market results in resources being allocated to their highest-valued use. When something occurs that leads resources not to be so allocated, we say that a market failure has resulted. §1.a
- A market failure problem occurs when no one owns something or when everyone owns something. §1.a

### 4. What are externalities?

- Private benefits of a transaction are the gains from trade that the individuals involved in the transaction achieve. Private costs are the opportunity costs that the individuals involved in the transaction must bear. §1.b
- Social costs and benefits are the total costs and benefits created by a transaction. When some costs are borne by those who are not involved in the private transaction, so that social costs exceed private costs, a negative externality occurs. When some benefits are received by those who are not involved in the private transaction, so that social benefits exceed private benefits, a positive externality occurs. §1.b
- When social costs and benefits are not equal to private costs and benefits, the market outcome is either overutilization or underutilization: Resources are not allocated to their highest-valued use. §1.b

### 5. What are free rider problems?

- Common ownership results in a market failure. Too much of the commonly owned good is consumed, and not enough is produced. §1.c
- Free riding means that one person will contribute less than that person expects to get in return because the person expects others to make up the difference. §1.c
- People free ride because they can—their self-interest tells them to get the most for the least. §1.c
- The problem with free riding is that if many people or everyone free rides, nothing gets done. §1.c

### 6. How does the government solve externality and free rider problems?

- Solutions to public good problems include private provision of the public good with



government financing and government provision of the good. §2.a

- There are several approaches to reducing the inefficiencies created by externalities. One approach is to impose a tax on the individual or institutions creating the externality. In another approach, the government requires or commands that those creating negative externalities reduce the amount created or that more production of positive externalities occur. In yet another, the government creates a market for the negative externalities by establishing ownership of the right to create the negative externality and allowing that ownership to be exchanged. §2.a.1, 2.a.2, 2.a.3

## 7. What are moral hazard and adverse selection problems?

- When buyers have less information than sellers, a situation can arise in which high-quality products are driven out of the market, leaving just low-quality products. This is called *adverse selection*. §3.a
- When buyers have more information than sellers about a particular item, buyers may alter their behavior with regard to that item once they have purchased it. For instance, once someone is insured, that person may act differently, taking on more risk. This is called *moral hazard*. §3.b

## 8. What are network externalities?

- Diminishing returns occur when each additional worker added to a fixed capital and land stock contributes to diminishing marginal output. Increasing returns occurs when each additional worker adds increasing amounts of additional output. New knowledge may create increasing returns. §4.a
- Network externalities occur when each additional user or member of a network increases the value of entire network. §4.b
- As a result of increasing returns and/or network externalities, it would seem that one network or one technology would dominate—that there would be a winner takes all. §4.b

- There is a *path dependence* to technology; once some historical accident or random event favors some technology, it becomes the standard and is used thereafter *even if it is not the most efficient*. §4.b

## 9. Is government intervention necessary or justified to solve market failures?

- One argument against government intervention to resolve externalities is that it is impossible to find cases where externalities do not appear. §5.a
- Coase stated that private parties can negotiate solutions to externalities when transactions costs are not too high. §5.a.1
- Voluntary contributions and actions can offset the problems of commons and public goods. §5.a.1
- According to Hayek, there is too much information for a central planner or government to determine price and quantity. It takes the invisible hand of the market to determine the price and quantity necessary for efficient resource allocation. §5.b
- An adverse selection or moral hazard problem can be reduced by having the person or firm creating the hazard and the person or firm being taken advantage of share in the costs. This is done through copayments and deductibles. §5.b.1
- The inefficiency of having the government try to solve a market failure problem is worse than the inefficiency of the market failure itself. §6.a
- Logrolling, pork barrel spending, and earmarks are all the result of legislators in a democracy appealing to constituents. §6.a
- The incentive of people working in government is not to provide a good or service in the most efficient manner. §6.a
- Rent seeking is the process of devoting resources to taking wealth away from one group in order to benefit another group. §6.b
- Small organized interests are able to secure rents from large disorganized groups. §6.b

## KEY TERMS

|                             |                            |                              |
|-----------------------------|----------------------------|------------------------------|
| adverse selection, 286      | internalized, 283          | principle of rivalry, 275    |
| asymmetric information, 286 | lemons market, 286         | private cost, 277            |
| club good, 275              | locked in, 290             | private good, 275            |
| commons good, 276           | logrolling, 295            | private property rights, 275 |
| copayment, 293              | market failure, 274        | public good, 276             |
| deductible, 293             | moral hazard, 287          | rent seeking, 295            |
| externality, 277            | network externalities, 288 | social cost, 277             |
| free rider, 276             | principle of mutual        | transactions costs, 292      |
| increasing returns, 288     | excludability, 275         |                              |

## EXERCISES

- How would you derive the demand for milk at the local grocery store? How would you derive the demand for tuna? How would you derive the demand for national defense?
- Explain why an externality might be a market failure. What does market failure mean?
- Use the accompanying table to answer the following questions.

| Quantity | Private Cost | Social Cost | Benefit |
|----------|--------------|-------------|---------|
| 1        | \$ 2         | \$ 4        | \$12    |
| 2        | \$ 6         | \$ 10       | \$22    |
| 3        | \$ 12        | \$ 18       | \$30    |
| 4        | \$ 20        | \$ 28       | \$36    |
| 5        | \$ 30        | \$ 40       | \$40    |

- What is the external cost per unit of output?
  - What level of output will be produced?
  - What level of output should be produced to achieve economic efficiency?
  - What is the value to society of correcting the externality?
- What level of tax would be appropriate to internalize the externality in exercise 3?
  - If the private cost and social cost columns were reversed in exercise 3, what would be the result? Would too much or too little of the good be produced? How would the market failure be resolved, by a tax or by a subsidy?
  - What is meant by the term *overfishing*? What is the fundamental problem associated with overfishing of the oceans? What might lead to *underfishing*?
  - How much pollution would exist if all externalities were internalized? Why would it not be zero? Use the same explanation to discuss the amount of health and safety that the government should require in the workplace.
  - Suppose the following table describes the marginal costs and marginal benefits of waste (garbage) reduction. What is the optimal amount of garbage? What is the situation if no garbage is allowed to be produced?

| Percentage of Waste Eliminated | Marginal Costs (millions of dollars) | Marginal Benefits (millions of dollars) |
|--------------------------------|--------------------------------------|---|
| 10%                            | 10                                   | 1,000                                   |
| 20%                            | 15                                   | 500                                     |
| 30%                            | 25                                   | 100                                     |
| 40%                            | 40                                   | 50                                      |
| 50%                            | 70                                   | 20                                      |
| 60%                            | 110                                  | 5                                       |
| 70%                            | 200                                  | 3                                       |
| 80%                            | 500                                  | 2                                       |
| 90%                            | 900                                  | 1                                       |
| 100%                           | 2,000                                | 0                                       |

- Elephants eat 300 pounds of food per day. They flourished in Africa when they could roam over huge areas of land, eating the vegetation in one area and then moving on so that the vegetation could renew itself. Now the area over which elephants can roam is declining. Without some action, elephants will become extinct. What actions might save elephants? What are the costs and benefits of such actions?
- Explain why the value of pollution permits in one area of the country rose 20 percent per year, while in another remained unchanged from year to year?

What would you expect to occur as a result of this differential?

11. Smokers impose negative externalities on non-smokers. Suppose the air in a restaurant is a resource owned by the restaurant owner.
  - a. How would the owner respond to the negative externalities of smokers?
  - b. Suppose the smokers owned the air. How would that change matters?
  - c. How about if the nonsmokers owned the air?
  - d. Finally, consider what would occur if the government passed a law banning all smoking. How would the outcome compare with the outcomes described above?
12. Discuss the argument that education should be subsidized because it creates a positive externality.
13. If the best solution to solving the positive externality problem of education is to provide a subsidy, explain why educational systems in all countries are government entities.
14. Amazon.com was the first mover in online book sales. It patented the one-click purchasing system. Barnes & Noble was a later entrant with bn.com. Is this a battle with a “winner takes all” outcome? Why or why not?
15. Which of the three types of government policies—antitrust, social regulation, or economic regulation—is the basis for each of the following? Which market failure would provide a theoretical basis for the government policy?
  - a. Beautician education standards
  - b. Certified Public Accounting requirements
  - c. Liquor licensing
  - d. The Clean Air Act
  - e. The Nutrition and Labeling Act
16. Some airline executives have called for “re-reregulation.” Why might an executive of an airline prefer to operate in a regulated environment?
17. Discuss the claim that social regulation is unnecessary. Does the claim depend on whether the structure of a market is primarily one of perfect competition or of oligopoly?
18. Explain why the government’s bailout of some banks in 2008 caused a moral hazard.
19. Describe what a lemons market is and give two examples.

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



# DO ECONOMISTS DISAGREE ABOUT ANYTHING? NOBEL SAVAGES

*National Post (Canada), August 20, 2008*

Joseph Stiglitz is a Nobel Prize winner in economics who doesn't like capitalism or markets very much. This does not make him that unusual. The very first economics Nobel, Jan Tinbergen, admitted without embarrassment that he had always seen his academic task as making the case for socialism. The roster of laureates is filled with skeptics about Adam Smith's invisible hand. Mr. Stiglitz has claimed, for example, that the hand "is invisible, at least in part, because it is not there."

Throughout the twentieth century, much of the economics profession drifted towards "Welfare Economics," which emphasized not how markets worked, but how they "failed." Their creed was that governments, guided by smart economists like themselves, might—nay, had to—prevent, or compensate for, market shortcomings.

One of the founding members of the school was Arthur C. Pigou, whose hatching of market-correcting "Pigovian taxes" is bemoaned in the *Post's* Nopigou Club. In an age when it is claimed that markets have to be "greened," and that all that this requires is a little judicious fiddling with taxes and prices, Mr. Pigou is much in fashion. After all, catastrophic man-made climate change is "the greatest market failure the world has ever seen," even if the world hasn't actually seen it yet.

Welfare economists suffer from twin delusions. One—as pointed out by the "Public Choice" school championed by another Nobel laureate, James Buchanan—is that politicians are selflessly interested in making effective policy rather than winning elections. The second delusion is that the market actually can be "fine tuned." Traditionally, welfare-oriented interventions—from minimum wage laws through rent controls to the promotion of biofuels—have ended both in taxpayer tears and damage to those who are meant to be "helped."

The very fact that Messrs. Stiglitz and Buchanan are Nobel economics laureates with diametrically opposed views was one of the reasons Alfred Nobel never set up a prize for economics in the first place (it was added later by Swedish bankers). Economics is not a science in which there is a broad body of knowledge on which all economists agree. Rather—when it is not mathematically abstruse and irrelevant—it is a field of ideological conflict which many economists enter intent on "improving" markets without understanding them in the first place.

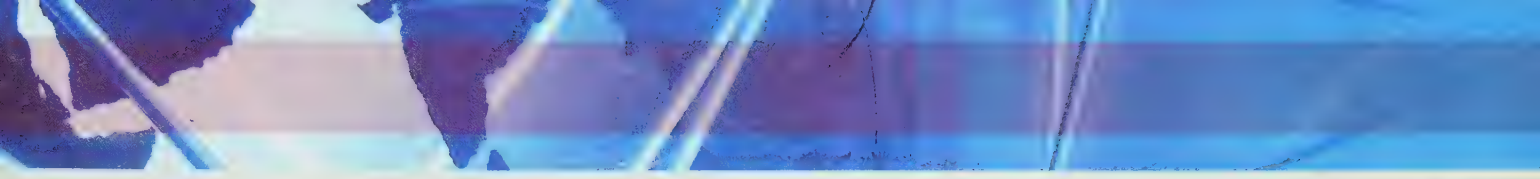
Many such economists, including Messrs. Tinbergen and Stiglitz, not to mention the late John Kenneth Galbraith, are primarily moralists, who reject the market as a messy affair based on greed and exploitation, and swell with pride at their role in "redistributing" other

people's money. They are always on the lookout for evidence of market failure or government success. Since this coincides with naive public perceptions, they are often "popular economists" (which is thus a contradiction in terms).

They are also inclined—as does Joseph Stiglitz—to write off promoters of markets as "fundamentalists," as if their conclusions were based not on studying the counter-intuitive workings of the economic order, but on some form of wacky religious faith-cum-mental disorder. To the extent that such blinkered fundamentalists might exist, as opposed to being merely straw men, they certainly have little or no voice in current policy-making.

In a recent piece in the *Globe and Mail*, Mr. Stiglitz suggested that free-market "rhetoric" is only ever used selectively; "embraced when it serves special interests, discarded when it does not." While this may certainly be true, it is no argument against markets any more than the Nazi doctor Joseph Mengele invalidated the case for medical science. No sensible economist suggests that markets are perfect, but those on the supposed "right" point out that they are much more efficient than most people imagine, while government meddling seldom if ever has the intended results.

The Invisible Hand may not be perfect, but it beats governments' Visible Bull in the China Shop every time.



Certainly, governments are needed to maintain property and contract rights, and to protect us against the threats posed by other governments, but expansive government tends to be both ineffective and oppressive. For men such as Mr. Stiglitz, however, it is sufficient to point out the theoretical shortcomings of the market and leave the question of the practical shortcomings of politics unaddressed. Thus, he is quick to point to the current financial crisis as “market failure,” but to downplay the role of inflationary government policies, or de facto government-backed institutions

such as Fannie Mae and Freddie Mac, in the debacle.

Mr. Stiglitz points out that, among their other failures, free markets produce “too much” pollution and “too little” research and development. Both these claims are dubious. The problems of pollution spring from inadequate property rights, and sometimes need correcting by governments, but it is surely worth reflecting that pollution laws tend to be much stricter in mature capitalist democracies. That’s because capitalism gives rise to demands for democracy, and democratic governments derive much of their power from

exploiting exaggerated fears of market failure!

As for markets promoting “too little” R&D, fans of governments claim that they have the responsibility, and ability, to promote society-wide innovation and investment. According to Professor Stiglitz, for example, the U.S. government “invented” the Internet. I plan to examine that claim, and its broader implications, in my next column.

*PETER FOSTER*

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**Source:** National Post, Aug 20, 2008, Peter Foster. Material reprinted with the express permission of: “National Post Inc.”

**T**his article is a terrific one in pointing out how much economists disagree. But it fails to show that it is actually just one aspect of the field of economics in which disagreements occur. Intellectual disagreement among economists occurs on a vital aspect of the field: Do markets work to provide people what they want and are willing to pay for at the lowest possible prices? Do resources get allocated to where they have the greatest value? Notice that it is not disagreement on what markets are, on demand, on supply, on the determination of prices and quantities; it is disagreement on the determination of whether the outcome provided by markets is better than the outcome that comes from government. This is the area of welfare economics.

Most economists would agree with the proposition that there are problems with markets when there is a lack of well-defined private property rights. But the consensus breaks down at this point. Some economists find such market failures everywhere, whereas others see such market failures as being few and far between. Some economists see a need for government intervention while others argue that government intervention makes matters worse rather than better.

The “public choice” school argues that politicians are self-interested individuals who cannot be

seen as benevolent leaders selflessly interested in making effective policy. They want to get elected or reelected, they want power and prestige or fame and money. These desires lead them to make decisions that are not necessarily in the best interests of the public. As the article notes, traditionally, welfare-oriented interventions—from minimum wage laws through rent controls to the promotion of bio-fuels—have ended both in taxpayer tears and damage to those who are meant to be “helped.”

This aspect of economics is indeed a “field of ideological conflict.” The economists mentioned by the author, including Tinbergen, Stiglitz, and the late John Kenneth Galbraith, do not like the outcome of the market—as the author said, these economists are primarily moralists who reject the market as a messy affair based on greed. They are always on the lookout for evidence of market failure. These economists, and many others, looked on the financial crisis that began in 2007 as a giant market failure, perhaps even the end of free-market capitalism. But they failed to look at the role of the government in creating the financial mess. Some economists would argue that rather than market failure, the problem was one of government failure.



## CHAPTER 14

# Resource Markets



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### FUNDAMENTAL QUESTIONS

- 1 Who are the buyers and sellers of resources?
- 2 How are resource prices determined?
- 3 How does a firm allocate its expenditures among the various resources?

**D**o you recycle? Are you concerned with global warming, saving the rain forest, and reducing pollution? Perhaps you've noticed the number of homeless people on the streets and wondered why they are homeless and what can be done about homelessness. Have you ever been discriminated against because of your age, race, or sex? Have you been touched by illegal drugs—gang wars, drive-by shootings, crime? Do you or do your parents have health insurance and medical coverage, or is it simply too expensive? Has anyone in your family been unemployed? In the following chapters we discuss some aspects of these issues as we examine the resource markets. Remember that resource markets provide the resources, or ingredients, for producing goods and services. They include the markets for labor, capital, and land in general terms, but more specifically they involve people and their jobs, physical and financial capital,

and natural resources. In this chapter, we'll look at how firms choose their resources and how firms draw on economic theory to help them decide which resources and how much of a given resource to use. In the

chapters that follow, we'll look at each market more closely, examining some of the societal questions and issues that arise in the process.



### 1 Who are the buyers and sellers of resources?

#### resource market

A market that provides one of the resources for producing goods and services: labor, capital, and land.

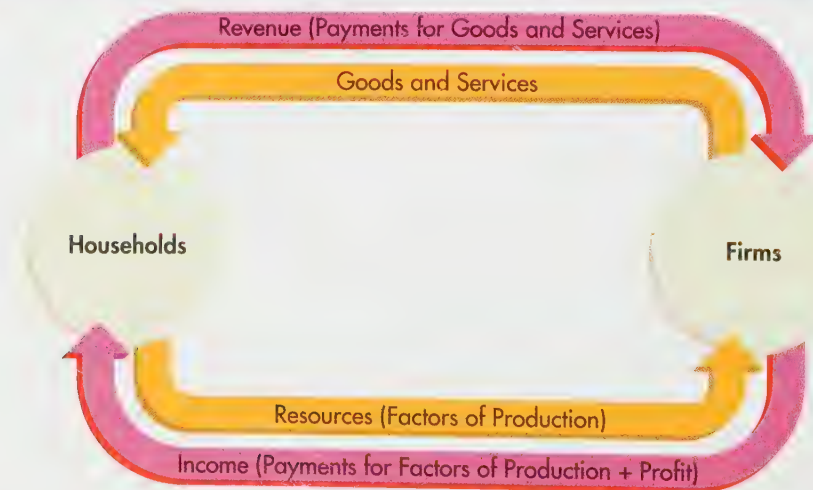
## 1. Buyers and Sellers of Resources

There are three general types of resource markets: those for land, labor, and capital. The price and quantity of each resource are determined in its **resource market**. Rent and the quantity of land used are determined in the land market. The wage rate and the number of people employed are determined in the labor market. The cost of capital (the interest rate) and the quantity of capital used are determined in the capital market. Although each of these markets is somewhat unique, they are all markets, and thus they simply involve the demand for and supply of that particular resource.

### 1.a. The Resource Markets

To understand the resource markets, you need to realize that the roles of firms and households are reversed from what they are in the product markets. Figure 1 is the simplest circular flow diagram that you saw in Chapter 4. It illustrates the roles of firms and households in the product and resource markets. The market for goods and services is represented by the top lines in the figure. Households buy goods and services from firms, as shown by the line going from firms to households; and firms sell goods and services and receive revenue, as shown by the line going from households to firms. The resource market is represented by the bottom half of the diagram in Figure 1.

**FIGURE 1** The Market for Resources



The buyers of resources are firms that purchase resources in order to produce goods and services. The sellers of resources are households that supply resources in order to obtain income with which to purchase goods and services.



Households are the sellers of resources, and firms are the buyers of resources. Households sell resources, as shown by the line going from households to firms; and firms pay households income, as shown by the line going from firms to households.

Households supply resources in order to earn income. By offering to work, individuals supply their labor; by saving, households supply firms with the funds used to purchase machines, equipment, and buildings; by offering their land and the minerals, trees, and other natural resources associated with it, households supply land. The supply of a resource consists of the sum of the quantities supplied by every resource owner. The supply of unskilled workers consists of the sum of the quantities that each and every unskilled worker is willing to work at each wage rate. The supply of office space in Phoenix, Arizona, offered for rent consists of the supplies offered by every owner of office space in Phoenix.

Resources are wanted not for themselves, but for what they produce. A firm uses resources in order to produce goods and services. Thus, the demand for a resource by a firm depends on the demand for the goods and services that the firm produces. For this reason, the demand for resources is often called a **derived demand**: An automobile manufacturer uses land, labor, and capital to produce cars; a retail T-shirt store uses land, labor, and capital to sell T-shirts; a farmer uses land, labor, and capital to produce agricultural products. The market demand for a resource consists of the demands of each firm that is willing and able to pay for that resource. An electric utility firm in Iowa demands engineers, as does a construction firm in Minnesota. The market demand for engineers consists of the demands of the Iowa utility and the Minnesota construction firm. Each firm's demand depends on separate and distinct factors, however. The electric utility firm hires more engineers to modernize its plant; the construction firm hires more engineers to fulfill its contracts with the state government to build bridges. Yet all firms have the same decision-making process for hiring or acquiring resources.



In resource markets, the sellers are the owners of land, labor, or capital, whereas the buyers are firms. In this particular situation, a chef is purchasing fresh lemons. The seller is the farmer who has grown the lemons.

#### derived demand

Demand stemming from what a resource can produce, not demand for the resource itself.

## RECAP

1. Resource markets are classified into three types: those for land, labor, and capital.
2. The buyers of resources are firms; the suppliers are households.

## 2. Demand for and Supply of Resources

How do you decide how much you are willing to pay for something? Don't you decide how much it is worth to you? This is what businesses do when they decide how much to pay a worker or how much to pay for a machine. A firm uses the quantity of each resource that will enable the firm to maximize profit.

### 2.a. The Firm's Demand

We know from previous chapters that firms maximize profit when they operate at the level where marginal revenue ( $MR$ ) equals marginal cost ( $MC$ ). The same thing occurs



- 2 How are resource prices determined?



**marginal revenue product (MRP)**

The additional revenue that an additional resource can create for a firm.

*The MRP of a resource is a measure of how much the additional output generated by the last unit of that resource is worth to the firm.*

**marginal factor cost (MFC)**

The additional cost of an additional unit of a resource.

in the resource markets.  $MR$  is called the marginal revenue product ( $MRP$ ), and  $MC$  is called the marginal factor cost ( $MFC$ ).

The additional value that an additional resource creates for a firm is called the **marginal revenue product (MRP)**. If Jennifer Aniston can bring in \$30 million in additional revenue to the movie studio for performing in one movie, then we can say that Jennifer Aniston's marginal revenue product for that movie is \$30 million. If an additional server at Applebee's can bring in \$30 an hour to the restaurant, we say that the server's  $MRP$  is \$30 an hour.

The marginal-revenue-product curve for a resource that is not unique is drawn in Figure 2. It slopes down because the additional revenue that an additional resource can generate for a firm declines as more resources are acquired. This is the law of diminishing marginal product we encountered in the chapter "Supply: The Costs of Doing Business." As Applebee's adds more and more servers, the additional revenue that each additional server can create for the restaurant declines. The  $MRP$  for a unique resource also declines as that resource is used more and more during a specific time period. If Jennifer Aniston performed in several movies during a year's time, it is likely that the additional revenue she could bring into the movie studio for each additional movie would decline.

## 2.b. Marginal Factor Costs

The cost of an additional unit of a resource, called the **marginal factor cost**, depends on whether the firm is purchasing resources in a market with many suppliers or in a

**FIGURE 2** Resource Market Demand and Market Supply



The demand curve for a resource slopes down, reflecting the inverse relation between the price of the resource and the quantity demanded. The supply curve for a resource slopes up, reflecting the direct relation between the price of the resource and the quantity supplied. Equilibrium occurs where the two curves intersect; the quantities demanded and supplied are the same at the equilibrium price. If the resource price is greater than the equilibrium price, a surplus of the resource arises and drives the price back down to equilibrium. If the resource price is less than the equilibrium price, a shortage occurs and forces the price back up to equilibrium.

market with one or only a few suppliers. The marginal factor cost is the actual cost to the firm of acquiring an additional resource.

**2.b.1. Hiring Resources in a Perfectly Competitive Market** If the firm is purchasing resources in a market in which there is a very large number of suppliers of an identical resource—a perfectly competitive resource market—the price to the firm of each additional unit of the resource is constant. Why? Because no seller is large enough to individually change the price. Servers at Applebee's would be an example. There are many people who are willing and able to work for Applebee's, and the firm can hire as much of the resource as it wants without affecting either the quantity available or the price of that resource.

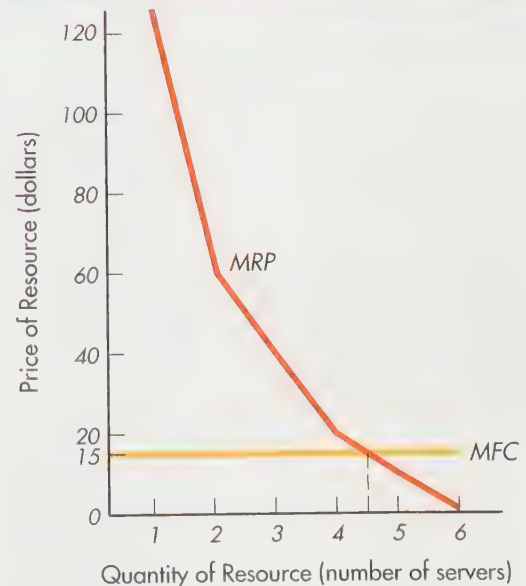
Let's use the information in the table and graph of Figure 3 to determine how many servers an Applebee's restaurant would hire. The firm can employ as many servers as it wants at \$15 per day—the *MFC* is a straight horizontal line at \$15. The first server hired has a marginal revenue product of \$130 per day and costs \$15 per day. It is profitable to hire her. A second brings in an additional \$60 per day and costs \$15 per day, and so is also profitable. The third server brings in \$40 per day, the fourth \$20 per day, the fifth \$10 per day, and the sixth nothing. Thus, the third and fourth servers are profitable, but the fifth, sixth, and seventh are not. The firm hires four servers. You can see in the graph that the marginal revenue product lies above the wage rate until after the fourth server is hired.

The firm hires additional servers until the *MRP* of one more server is equal to the marginal factor cost of that server ( $MRP = MFC$ ). This is a general rule; it holds whether the firm sells its output in a perfectly competitive, monopoly, monopolistically competitive, or oligopoly market; and it holds for all resources, land and capital as well as labor.

*Resources will be employed up to the point at which  $MRP = MFC$ .*

**FIGURE 3** The Employment of Resources

| Number of Servers | <i>MRP</i> | <i>MFC</i> |
|-------------------|------------|------------|
| 1                 | \$130      | \$15       |
| 2                 | \$ 60      | \$15       |
| 3                 | \$ 40      | \$15       |
| 4                 | \$ 20      | \$15       |
| 5                 | \$ 10      | \$15       |
| 6                 | \$ 0       | \$15       |



The marginal revenue product and the marginal factor cost together indicate the number of servers the restaurant would hire. The *MRP* and the *MFC* for a restaurant are listed in the table. The *MRP* curve and the *MFC* curve are shown in the graph. The marginal revenue product exceeds the marginal factor cost (wage rate) until after the fourth server is hired. The firm will not hire more than four servers, for then the costs would exceed the additional revenue produced by the last server hired.

**monopsonist**

A firm that is the only buyer of a resource.

*A firm buying in a perfectly competitive resource market will pay the marginal revenue product; a monopsonistic firm will pay less than the marginal revenue product.*



- 3** How does a firm allocate its expenditures among the various resources?

*In equilibrium, the last dollar spent on resources must yield the same marginal revenue product no matter which resource the dollar is spent on.*

**2.b.2. Hiring Resources as a Monopsony Buyer** When just one firm is acquiring a resource, that firm is called a **monopsonist**. A monopsonist is a monopoly buyer. In the early days of mining in the United States, it was not uncommon for firms to create entire towns in order to attract a readily available supply of labor. The sole provider of jobs in the town was the mining company. Thus, when the company hired labor, it affected the prices of all workers, not just the worker it recently hired. In the 1970s along the Alaskan pipeline, and in the 1980s in foreign countries where U.S. firms were hired to carry out specialized engineering projects or massive construction jobs, small towns dependent on a single U.S. firm were created. There are cases in which a monopsony exists even though a company town was not created. For instance, many universities in small communities are monopsonistic employers—they are the primary employer in the town. When these universities hire a mechanic, they affect the wage rates of all mechanics in the town. Walmart is often called a monopsony because it locates a store in a small town and quickly becomes the major, if not almost the only, employer in the town.

A monopsony firm is able to pay resources less than their marginal revenue products because the resource owners have no choice. They can't rent their land to someone else or go work for someone else.

## 2.c. Hiring When There Is More Than One Resource

To this point we've examined the firm's hiring decision for one resource, with everything else, including the quantities of all other resources, held constant. However, a firm uses several resources and makes hiring decisions regarding most of them all the time. How does the firm decide what combinations of resources to use? Like the consumer deciding what combinations of goods and services to purchase, the firm will ensure that the benefits of spending one more dollar are the same no matter which resource the firm chooses to spend that dollar on.

You may recall that the consumer maximizes utility when the marginal utility per dollar of expenditure is the same for all goods and services purchased:

$$MU_{\text{coffee}}/P_{\text{coffee}} = MU_{\text{gas}}/P_{\text{gas}} = \dots = MU_n/P_n$$

A similar rule holds for the firm that is attempting to purchase resource services in order to maximize profit and minimize costs. The firm will be maximizing profit when its marginal revenue product per dollar of expenditure on all resources is the same:

$$MRP_{\text{land}}/MFC_{\text{land}} = MRP_{\text{labor}}/MFC_{\text{labor}} = \dots = MRP_n/MFC_n$$

As long as the marginal factor cost of a resource is less than its marginal revenue product, the firm will increase profit by hiring more of the resource. If a dollar spent on labor yields less marginal revenue product than a dollar spent on capital, the firm will increase profit more by purchasing the capital than by purchasing the labor.

If a resource is very expensive relative to other resources, then the expensive resource must generate a significantly larger marginal revenue product than the other resources. For instance, for a firm to remain in Manhattan (New York City), it must generate a significantly larger marginal revenue product than it could obtain in Dallas or elsewhere because rents are so much higher in Manhattan. A professional athlete who gets paid \$30 million a year has to bring in more revenue for the team than another who earns \$2 million a year.

A firm that is in equilibrium in terms of allocating its expenditures among resources will alter the allocation only if the cost of one of the resources rises relative to the others. For instance, if government-mandated medical or other benefits mean that labor costs rise while everything else remains constant, then firms will tend to hire less labor and use



more capital and land if they can. Everything else the same, if the costs of doing business in the United States rise, firms will locate offices or plants in other countries.

## 2.d. Product Market Structures and Resource Demand

Firms purchase the types and quantities of resource services that allow them to maximize profit; each firm equates the  $MRP$  per dollar of expenditure on all resource services used. The  $MRP$  depends on the market structure in which the firm sells its output. A perfectly competitive firm produces more output and sells that output at a lower price than a firm operating in any other type of market, everything else the same. Since the perfectly competitive firm produces more output, it must use more resources.

For the perfectly competitive firm, price and marginal revenue are the same,  $P = MR$ . Thus, the marginal revenue product is often called the value of the marginal product,  $VMP$ , to distinguish it from the marginal revenue product.

The demand for a resource by a single firm is the  $MRP$  of that resource, no matter whether it sells its goods and services as a monopolist or as a perfect competitor (for the perfectly competitive firm,  $VMP = MRP$ , so that  $MRP$  is its resource demand as well). However, since price is greater than marginal revenue for the firms that are not selling in a perfectly competitive market,  $VMP$  would be greater than  $MRP$ , which indicates that the perfectly competitive firm's demand curve for a resource lies above (or is greater than) the demand curve for a resource by a monopoly firm, an oligopoly firm, or a monopolistically competitive firm.

### RECAP

1. The  $MRP$  of a resource is a measure of how much the additional output generated by the last unit of the resource is worth to the firm.
2. Resources are hired up to the point at which  $MRP = MFC$ .
3. In a perfectly competitive resource market, resources are paid an amount equal to their marginal revenue product. In a monopsonistic resource market, resources are paid less than their marginal revenue product.
4. A firm will allocate its budget on resources up to the point where the last dollar spent yields an equal marginal revenue product no matter on which resource the dollar is spent.
5. A perfectly competitive firm will hire and acquire more resources than firms selling in monopoly, oligopoly, or monopolistically competitive product markets, everything else the same.

## 3. Resource Supplies

The owners of land, labor, and capital are households or individuals. Individuals act so as to maximize their utility. They receive utility when they consume goods and services, but they need income to purchase these goods and services. To acquire income, households must sell the services of their resources. They must give up some of their leisure time and go to work or offer the services of the other resources they own in order to acquire income. The quantity of resources that are supplied depends on the wages, rents, interest, and profits offered for those resources. If, while everything else is held constant, people can get higher wages, they will offer to work more hours; if they can obtain more rent for their land, they will offer more of their land for use, and so on. The quantity supplied of a resource rises as the price of the resource rises.

**economic rent**

The portion of earnings above transfer earnings.

**transfer earnings**

The amount that must be paid to a resource owner to get him or her to allocate the resource to another use.

### 3.a. Economic Rent

When a resource has a perfectly inelastic supply (vertical supply curve), its pay or earnings is called **economic rent**. If a resource has a perfectly elastic supply curve, its pay or earnings is called **transfer earnings**. For upward-sloping supply curves, resource earnings consist of both transfer earnings and economic rent. Transfer earnings is what a resource could earn in its best alternative use (its opportunity cost). It is the amount that must be paid to get the resource to “transfer” to another use. Economic rent is earnings in excess of transfer earnings. It is the portion of a resource’s earnings that is not necessary to keep the resource in its current use. A movie star can earn more than \$20 million per movie but probably could not earn that kind of income in another occupation. Thus, the greatest part of the movie star’s earnings is economic rent.

There are two different meanings for the term *rent* in economics. The most common meaning refers to the payment for the use of something, as distinguished from payment for ownership. In this sense, you purchase a house but rent an apartment; you buy a car from Chrysler but rent cars from Avis. The second use of the term *rent* is to mean payment for the use of something that is in fixed—that is, perfectly inelastic—supply. The total quantity of land is fixed; therefore, payment for land is economic rent. When something is in fixed supply, even a higher rent cannot increase its quantity. Because the term *economic rent* is associated with payments for something that don’t increase the quantity supplied, it is often applied to politics. For instance, a payment for favors from a government official is called economic rent; it is a payment that does not create anything or increase the quantity supplied of anything. The government official uses tax money to provide you benefits; thus, the payment merely transfers wealth from one person to another. It does not increase the quantity of something.

## RECAP

1. Firms purchase resources in such a way that they maximize profits. Households sell resources in order to maximize income.
2. Transfer earnings is the portion of total earnings required to keep a resource in its current use.
3. Economic rent is earnings in excess of transfer earnings.

## 4. A Look Ahead

In the next few chapters, we will examine some interesting features of resource markets. We’ll look at labor markets and discuss why different people receive different wages, why firms treat employees the way they do, the impact of labor laws, and the causes and results of discrimination. We’ll discuss financial markets, physical and financial capital, and explore why firms carry out research and development. We’ll look at the markets for land and natural resources. Selling resource services creates income, so we’ll examine who has income and why. And we’ll look at how the government gets involved in providing needed human services such as health care and social security.

Often we will discuss resource markets at the level of the individual firm or individual household, but typically we will refer to the market as a whole. For instance, if we talk about the “labor market,” we are talking about the demand for every worker by every firm and the supply of every possible employee by every individual. The market demand curve slopes downward, indicating that as the price of a resource falls, the quantity demanded rises, everything else held constant. The market supply curve slopes upward, indicating that as the price of a resource falls, the quantity supplied falls, everything else held constant.

## SUMMARY

### 1. Who are the buyers and sellers of resources?

- The term *resource markets* refers to the buyers and sellers of three classes of resources: land, labor, and capital. §1
- The buyers of resources are firms that purchase resources in order to produce goods and services. §1.a
- The sellers of resources are households that supply resources in order to obtain income with which to purchase goods and services. §1.a

### 2. How are resource prices determined?

- A single firm's demand for a resource is the marginal-revenue-product (*MRP*) curve for that resource. §2.a
- A firm purchasing resources in a perfectly competitive resource market will hire resources up to the point where  $MRP = MFC$ . A firm that is one of only a few buyers or the only buyer of a particular resource (a monopsonist) will face a

marginal-factor-cost (*MFC*) curve that is above the supply curve for that resource. As a result, the resource is paid less than its marginal revenue product. §2.b.1, 2.b.2

### 3. How does a firm allocate its expenditures among the various resources?

- A firm will allocate its budget on resources in such a way that the last dollar spent will yield the same marginal revenue product no matter on which resource the dollar is spent. §2.c
- Households own resources and decide how much of the resource services to offer for use. The supply of a resource depends on the income received by the owners of that resource. §3
- Payments for the use of resources consist of two parts: transfer earnings and economic rent. Transfer earnings are the rate of pay necessary to keep a resource in its current use. Economic rent is the excess of pay above transfer earnings. §3.a

## KEY TERMS

derived demand, 305  
economic rent, 310  
marginal factor cost  
(*MFC*), 306

marginal revenue product  
(*MRP*), 306  
monopsonist, 308

resource market, 304  
transfer earnings, 310

## EXERCISES

1. What does it mean to say that the demand for resources is a derived demand? Is the demand for all goods and services a derived demand?
2. Using the information in the following table, calculate the marginal revenue product ( $MRP = MPP \times MR$ ).

| Unit of Resources | Total Output | Price | Resource Price |
|-------------------|--------------|-------|----------------|
| 1                 | 10           | \$5   | \$10           |
| 2                 | 25           | \$5   | \$10           |
| 3                 | 35           | \$5   | \$10           |
| 4                 | 40           | \$5   | \$10           |
| 5                 | 40           | \$5   | \$10           |

3. Using the data in exercise 2, determine how many units of resources the firm will want to acquire.
4. Suppose the output price falls from \$5 to \$4 to \$3 to \$1 in exercise 2. How would that change your answers to exercises 2 and 3?
5. Using the data in exercise 2, calculate the marginal factor cost.
6. Suppose the resource price rises from \$10 to \$12 to \$14 to \$18 to \$20 as resource units go from 1 to 5. How would that change your answer to exercise 5? How would it change your answer to exercise 3?
7. Using exercise 6, calculate the transfer earnings and economic rent of the third unit of the resource when four units of the resource are employed.



Do the same calculations when only three units of the resource are employed. How do you account for the different answers?

8. Can you explain why Jennifer Aniston earns \$30 million a year and a schoolteacher \$40,000 a year?
9. What is a monopsonist? How does a monopsonist differ from a monopolist?
10. Supposedly Larry Bird once said that he would play basketball for \$10,000 per year. Yet he was paid over \$1 million per year. If the quote is correct, how much were Bird's transfer earnings? How much was his economic rent?
11. Walmart is vilified by many people as being evil, destroying jobs and cities. Others note that it has the lowest prices and is the largest employer in the country. What is the difference? Is Walmart a monopsonist?
12. Early in her journalistic career, Gloria Steinem posed as a Playboy Bunny to examine the inside of a Playboy Club. Steinem discovered that the Bunnies had to purchase their costumes from the club, pay for cleaning them, purchase their food from the club, and so on. This "company store" exploited the employees (the Bunnies), according to Steinem. Explain what Steinem meant by exploitation.
13. Explain the idea behind the lyrics "You load 16 tons, and what do you get? You get another day older and deeper in debt. Saint Peter, don't you call me, 'cause I can't go. I owe my soul to the company store."
14. In some small cities, Walmart is the only firm offering many types of goods. Suppose the demand for those goods is very price-inelastic. How does that affect how Walmart treats its employees? What is the marginal factor cost and the wage rate?
15. The National Economic Council recently sent an e-mail to each of its state affiliates requesting that they send a letter to their Congressperson and Senators asking them to support the bill to provide government funds to the Council. Explain whether this is rent seeking or not.
16. Small, well-organized groups are often more successful at rent seeking than other organizations. Why?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

## JAZZ WON'T BITE ON “OUTLANDISH” OFFERS

*Deseret Morning News, June 27, 2004*

**T**he Jazz will not match crazy offers, and will not overpay, even for one of their own.

Fair warning has been issued.

Or so has suggested Jazz owner Larry H. Miller, who made it clear when the 2003–04 NBA season ended that any or all who intend to be back next season must be realistic—even if Utah does have roughly \$26 million in under-the-cap money to spend on NBA free agents this summer.

“Everybody has to fit into our salary structure,” Miller said. “If someone has an outlandish offer, that’s something we’re trying to stay away from.”

All four of the Jazz’s restricted free agents, however, are expected to test the open market when the league’s summer negotiating period opens Thursday.

The Jazz seem quite intent on re-signing shooting guard Gordan Giricek, though Portland and possibly New Jersey may pursue him as well. They like big man Jarron Collins, too—so much so he was not exposed for last Tuesday’s NBA Expansion Draft.

Guards Carlos Arroyo and Mo Williams could both be back, though Miami may show interest in Arroyo, and the Charlotte Observer reported Saturday that the expansion Charlotte Bobcats

might consider extending an offer sheet to Williams.

As for unrestricted free agent center Greg Ostertag, it remains possible he will be back for a 10th season in Utah.

Miller, though, has made it known the price tag on ‘Tag—who made \$8.67 million last season—would have to drastically come down.

“We know, pretty much, who Greg is,” the Jazz owner said. “So, what we’d have to do is make our expectations on what we think he’ll give us match up with what he’s earning.”

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**Source:** Tim Buckley, June 27, 2004, *Deseret Morning News*. Reprinted with permission.

People are paid an amount that depends on how much their work contributes to the profits of the firm. This is measured by the marginal revenue product (*MRP*), the additional revenue of one more unit of work times the productivity of that one unit of work. If a person has skills that enable him or her to be more productive, then he or she will be paid more.

According to the article, "The Jazz will not match crazy offers, and will not overpay, even for one of their own." The Salt Lake City basketball franchise and its owner, Larry Miller, says it will not overpay. What does the term "overpay" mean? If Greg Ostertag or any basketball player is offered a large salary to play basketball it is because the team making the offer believes Ostertag will bring in enough fans to the basketball games that revenues will offset Ostertag's pay. Now if another team, say the Phoenix Suns, offers him more than the Jazz offers Ostertag, then the Suns franchise must

believe Ostertag will bring in more revenues to the Suns than he brings in to the Jazz. This is not overpaying. This is simply paying the market price. But, should the Suns offer Ostertag more than the Suns franchise thinks Ostertag will bring in in revenue, then the Suns would be "overpaying."

Why would a team "overpay" some player? It wouldn't. If a player is expected to perform at a high level but then does not, that is not overpaying—it is paying on the expectation of future revenues brought in by that player. In hindsight the player is being paid more than he contributes to the franchise, but not in foresight. It makes no sense for a firm to overpay. A firm that overpays employees, just like a team that overpays players, will lose profits. Why would a firm do that? Why would a basketball franchise do that? They wouldn't. So perhaps Larry Miller is trying to bluff his players into not attempting to get more pay; but this bluff will be called if a player is worth more than the Jazz are paying him.



## CHAPTER 15

# The Labor Market



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### FUNDAMENTAL QUESTIONS

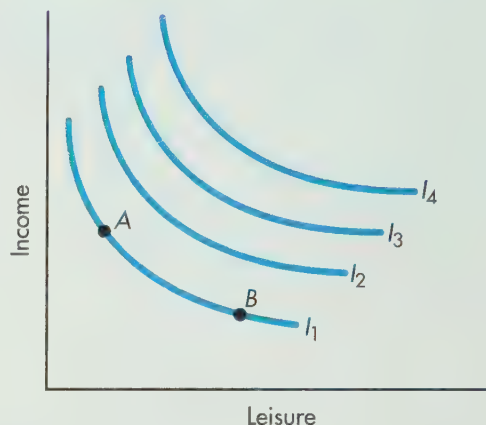
- 1 Are people willing to work more hours for higher wages?
- 2 What are compensating wage differentials?
- 3 What is the impact of technological change on workers?
- 4 What is offshoring?
- 5 What is the impact of a minimum wage law on unskilled labor?
- 6 What is the effect of income taxes on workers?
- 7 What is the effect of illegal immigration on the economy?
- 8 Are discrimination and freely functioning markets compatible?

Is something out of balance when teachers, firefighters, and police officers earn salaries that are just 1 percent of the salary of the average professional basketball player? Why are some jobs that could be done by Americans being sent to other countries? Why are unskilled people from less-developed countries flooding into the developed countries to do menial or unskilled jobs? Are these events things to worry about? In this chapter we examine these issues.

## ECONOMIC INSIGHT

### Labor Leisure Trade-off and Indifference Curves

The income-leisure trade-off is typically illustrated using indifference curves and income constraints discussed in the Appendix to the chapter “Consumer Choice.” In the following figure we plot income on the vertical axis and leisure on the horizontal axis. The assumption here is that to get more income a person has to put more time into working and thus has less time for leisure. So as leisure increases (we move out the horizontal axis), we can earn less income. The indifference curves labeled  $I_1$  through  $I_4$  represent all combinations of income and leisure between which the individual is indifferent. All combinations of income and leisure along  $I_1$ , such as points A and B, generate the same utility for the individual. All combinations of income and leisure along  $I_2$  are preferred to those along  $I_1$  under the assumption that more is preferred to less. Similarly,  $I_3$  is more preferred than  $I_2$  and  $I_4$  over  $I_3$ . The indifference curves illustrate the trade-off between income and leisure.



## 1. The Supply of Labor

The supply of labor comes from individual households. Each member of a household must determine whether to give up a certain number of hours each day to work. That decision is the individual’s labor supply decision and is called the *labor-leisure trade-off*.



- 1 Are people willing to work more hours for higher wages?

People have 24 hours a day during which they can either work or do something other than work (leisure).

### 1.a. Individual Labor Supply: Labor-Leisure Trade-off

There are only 24 hours in a day, and there are only two things that people can do during this time: (1) work for pay or (2) not work for pay. *Any* time spent not working is called *leisure time*. Leisure time includes being a “couch potato,” going to clubs, volunteering to serve food at a homeless shelter, or participating in any other activity except working at a paying job. People want leisure time, but they also want food, housing, cars, fun, and many other things. To be able to buy goods and services, people usually have to work.

It is important to recognize that the cost of leisure time is the money that could be earned working. A person’s wage or salary is his or her opportunity cost of leisure. This creates an interesting dilemma—you want to earn more money so you can purchase goods and services, yet you want to have time to enjoy the things you buy. So you have to trade off work and leisure time: If you take more leisure, you work less, and vice versa. So how many hours do people spend working and how many hours do they devote to other activities?

In addition to going to school, do you work? Let’s say that you earn \$10 per hour and work 10 hours a week. What would you do if the wage rate for your job increased to \$15 per hour? You might ask to work *more* hours each week. What would you do if the wage rate increased to \$50 per hour? You might drop your classes and work 40 or more hours a week. The higher wage means that an hour of leisure costs more—\$50 rather than \$10. As the price of a normal good goes up, people purchase less of it. As the price of leisure goes up, people work more.

Leisure is a little different from other normal goods—such as books, gasoline, and Starbucks coffee—because of the limited number of hours in a day. You can't work 24 hours a day—at least, not for very long. What happens with most people is that as they earn more money, they want more time to enjoy what the money can buy. This becomes a problem: If I work more, I have more money, but I have less time to enjoy what the money can buy; if I work less so that I can have more time to enjoy what I purchase, I have less income.

When the wage rate increases, people choose to work more (or work harder or better), but since they now have more money, they can purchase more and may decide that they would rather take a little more leisure time. Thus, a wage increase creates two opposing effects; one leads to increased hours of work, and one leads to decreased hours of work. This means that the quantity of labor supplied may rise or fall as the wage rate rises.

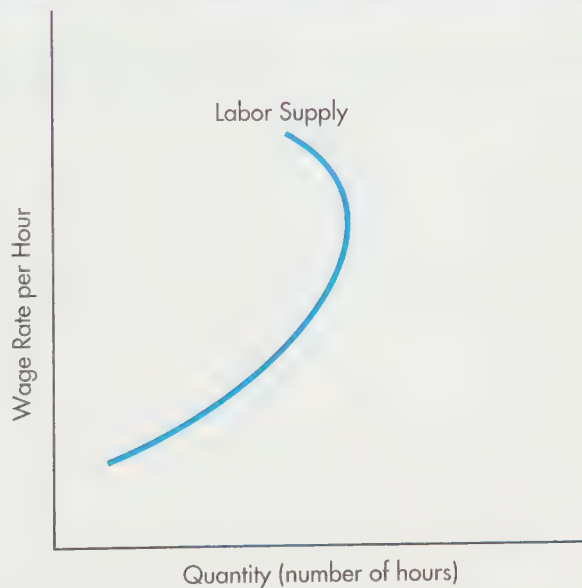
The labor supply curve shown in Figure 1 is what the labor supply curve for an individual usually looks like. It rises as the wage rate rises until the wage is sufficiently high that people begin to choose more leisure; then the curve begins to turn backward. This is called the **backward-bending labor supply curve**.

**1.a.1. Do People Really Trade Off Labor and Leisure?** About one-half of the workers in the United States report being paid an hourly wage. Although it might seem that people who work a set number of hours a week at a particular hourly wage do not have the luxury of deciding at each minute whether to work or to take leisure time, it is not inappropriate to examine the labor market as if they do. This is because there is flexibility in that some people might be able to choose between part-time and full-time work, and because over a month, a year, or several years, people do choose to put in more or less time on the job. Some people choose occupations that enable them to have

### backward-bending labor supply curve

A labor supply curve indicating that a person is willing and able to work more hours as the wage rate increases until, at some sufficiently high wage rate, the person chooses to work fewer hours.

**FIGURE 1** The Backward-Bending Labor Supply Curve



As the wage rate rises, people are willing and able to supply more labor, at least up to some high wage rate. A higher wage rate means that the opportunity cost of leisure time increases, so that people will purchase less leisure (will work more). Conversely, as the wage rate rises and people's incomes rise, more of all goods are purchased, including leisure time. As a result, fewer hours of work are supplied. Which of these opposing effects is larger determines whether the labor supply curve slopes upward or downward. The most commonly shaped labor supply curve is one that slopes upward until the wage rate reaches some high level and then, as people choose more leisure time, begins to bend backward.



more flexibility; many prefer to be self-employed in order to be able to choose whether to put in more or less time on the job. People can also *moonlight*—that is, work an additional job or put in extra hours after their full-time job is completed.

### 1.b. From Individual to Market Supply

If the labor supply curve for each individual slopes upward, then the market supply curve (the sum of all individual supply curves) also slopes upward. Even if each individual labor supply curve bends backward at some high wage, it is unlikely that all of the curves will bend backward at the same wage. Not everyone has the same trade-offs between labor and leisure; not all offer to work at the same wage rate; not all want the same kind of job. As the wage rate rises, some people who choose not to participate in the labor market at lower wages are induced to offer their services for employment at a higher wage. The labor market supply curve slopes up because the number of people who are both willing and able to work rises as the wage rate rises and because the number of hours that each person is willing and able to work rises as the wage rate rises, at least up to some high wage rate.

### 1.c. Equilibrium

The labor market consists of the labor demand and labor supply curves. We've just discussed labor supply. Labor demand is based on the firm's marginal-revenue-product curves, as discussed in the previous chapter. The marginal revenue product is the value that the individual employee contributes to the firm. The term *productivity* typically refers to all workers together and means the output per worker or average product. If we talk about the productivity of an individual person, then we are referring to the marginal product, the additional product provided by that individual worker. The intersection of the labor demand and labor supply curves determines the equilibrium wage,  $W_e$ , and the quantity of hours people work at this equilibrium wage,  $Q_e$ , as shown in Figure 2.

**FIGURE 2** Labor Market Equilibrium

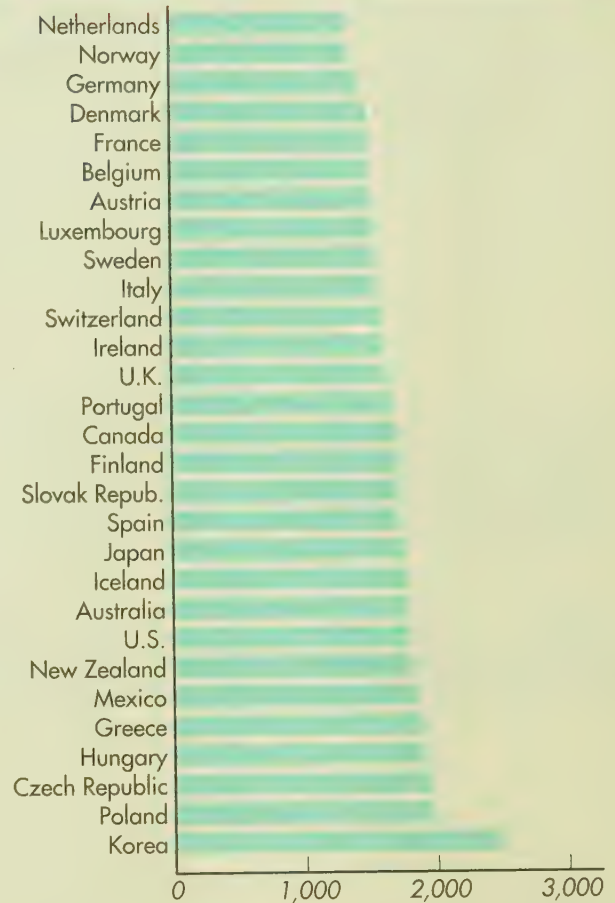


If all workers are the same to all firms—that is, if a firm doesn't care whether it hires Roberto, Renee, or Ryan—and if all firms and jobs are the same to workers—that is, if a worker doesn't care whether a job is with IBM or Ted's Hot Dog Stand—then one demand curve and one supply curve define the labor market. The intersection of the two curves is the labor market equilibrium at which the wage rate is determined.

# GLOBAL BUSINESS INSIGHT

## Hours Spent Working

The average employed person in the United States is now on the job 1,824 hours a year, but the average employed person in seven other nations puts in more time. The nation in which the average annual number of hours worked is largest is Korea, followed by the former Communist bloc countries of Poland, Hungary, and the Czech Republic, and then Greece, Mexico, and New Zealand. The Netherlands, Norway, Germany, Denmark, and France remain the nations with the lowest average annual hours of work, just slightly more than 26 hours a week. In the United States, the average workweek is 35 hours. If you consider that the average vacation time is less than two weeks in the United States and around four weeks in the European countries, the number of hours spent working when not on vacation is 37 in the United States and 29 in Europe.



**Source:** OECD Statistics Portal, February 2011; <http://www.oecd.org/topicstatsportal>.

The labor market pictured in Figure 2 suggests that as long as all workers are the same and all jobs are the same, there will be one equilibrium wage. But workers are not all the same, jobs are not all the same, and wages are definitely not all the same. College-educated people earn more than people with only a high school education, and people with a high school education earn more than those with only a grammar school education. Older workers earn more than younger workers. Men earn more than women. Whites earn more than nonwhites.

In general, workers will be paid their marginal revenue products—that is, they are paid according to how much they contribute to the profits of their employers. The more productive a worker is, the higher his or her compensation will be, and vice versa. However, in reality, there are large salary differences for people with similar levels of productivity, and people who are vastly different in terms of productivity are paid the same. This occurs because, even though two people generate about the same output, the value that one provides exceeds the value provided by the other. We'll discuss a few cases in the remainder of this chapter.

RECAP

1. An increase in the wage rate causes workers to increase the hours they are willing and able to work and reduce their hours of leisure; at the same time, the wage increase also means that income is higher and more leisure can be purchased. This causes the individual labor supply curve to be backward bending.

2. The labor market supply curve slopes upward because as the wage rate rises, more people are
- willing and able to work, and people are willing and able to work more hours.
3. Equilibrium in the labor market defines the wage rate and the quantity of hours that people work at that wage.

If people were identical, if jobs were identical, and if information were perfect, there would be no wage differentials.



2 What are compensating wage differentials?

compensating wage differentials

Wage differences that make up for the higher risk or poorer working conditions of one job over another.

2. Wage Differentials

If all workers are the same to a firm—that is, if a firm doesn’t care whether it hires Roberto, Renee, or Ryan—and if all firms and jobs are the same to workers—that is, if IBM is no different from Ted’s Hot Dog Stand to individual workers—then the one demand for labor and the one supply of labor define the one equilibrium wage. However, firms do differentiate among workers and workers do differentiate among firms and jobs, and so there is more than one labor market and more than one equilibrium wage level. Wages differ from job to job and from person to person. The reasons for wage differences include compensating wage differentials and differences in individual levels of productivity.

2.a. Compensating Wage Differentials

Some jobs are dangerous or unhealthy. Table 1 shows which jobs have people missing the most work. Table 2 lists the jobs with the greatest chance of dying on the job. For instance, loggers and pilots of small planes used as crop dusters have the greatest chance of dying on the job, according to Table 2. Other jobs, such as coal mining or garbage collecting, might be considered quite unpleasant. In most market economies, enough people voluntarily choose to work in unpleasant jobs that the jobs get filled. People choose to work in unpleasant occupations because of **compensating wage differentials**—wage differences that make up for the high risk or poor working conditions

| TABLE 1 Days Away from Work  |           |
|--|-----------|
| Occupational injuries and illnesses involving days away from work for selected occupations, 2007 (thousands) |           |
| Occupation   | Thousands |
| Registered nurses  | 20.02     |
| Maintenance and repair workers, general  | 23.46     |
| Carpenters   | 23.80     |
| Janitors and cleaners, except maids and housekeeping cleaners  | 30.06     |
| Retail salespersons  | 32.92     |
| Truck drivers, light or delivery services  | 32.93     |
| Construction laborers  | 34.18     |
| Nursing aides, orderlies, and attendants   | 44.93     |
| Truck drivers, heavy and tractor-trailer   | 57.05     |
| Laborers and freight, stock, and material movers   | 79.00     |

Source: U.S. Department of Labor, Bureau of Statistics, *Census of Fatal Occupational Injuries, 2004, 2009.*

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**TABLE 2** Most Dangerous Jobs

| Job   | Fatality Rate (per 100,000 employees) | Number of Deaths |
|---|---------------------------------------|------------------|
| Logging workers   | 92.4                                  | 85               |
| Aircraft pilots   | 92.4                                  | 109              |
| Fishers   | 86.4                                  | 38               |
| Iron and steel workers  | 47.0                                  | 31               |
| Garbage collectors  | 43.2                                  | 35               |
| Farmers and ranchers  | 37.5                                  | 307              |
| Roofers   | 34.9                                  | 94               |
| Power line workers  | 30.0                                  | 36               |
| Truckers and driver/sales workers<br>(e.g., pizza and newspaper delivery) | 27.6                                  | 905              |
| Taxi drivers, chauffeurs  | 24.2                                  | 67               |

**Source:** U.S. Department of Labor, Bureau of Labor Statistics, *Census of Fatal Occupational Injuries, 2004, 2009*.

of a job. Workers mine coal, clean sewers, and weld steel beams 50 stories off the ground because, compared to alternative jobs for which they qualify, these jobs pay well.

Figure 3 illustrates the concept of compensating wage differentials. There are two labor markets, one for a risky occupation and one for a less risky occupation. At each

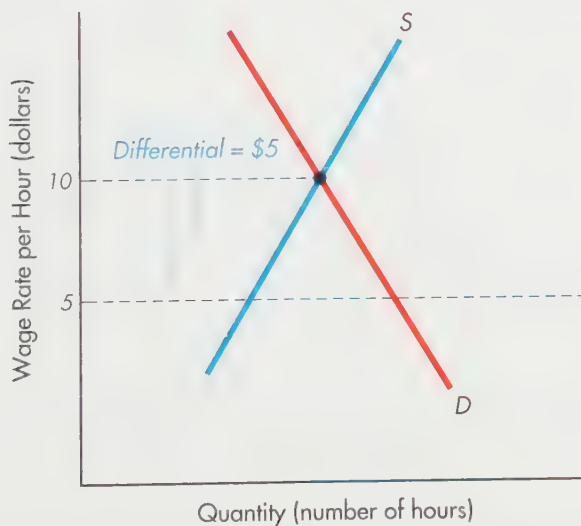
**FIGURE 3** Compensating Wage Differentials**(a) Risky Occupation****(b) Less Risky Occupation**

Figure 3(a) shows the market for a risky occupation. Figure 3(b) shows the market for a less risky occupation. At each wage rate, fewer people are willing and able to work in the risky occupation than in the less risky occupation. Thus, the supply curve of the risky occupation is higher (supply is less) than the supply curve of the less risky occupation. As a result, the wage in the risky occupation (\$10 per hour) is higher than the wage in the less risky occupation (\$5 per hour). The differential (\$10 - \$5 = \$5) is an equilibrium differential—the amount necessary to induce enough people to fill the jobs. If the differential were any higher, more people would flow to the risky occupation, driving wages there down and wages in the less risky occupation up. If the differential were any lower, shortages would prevail in the risky occupation, driving wages there up.



© Miguel Angelo Silva/Alamy

Commercial deep-sea divers are exposed to the dangers of drowning and several physiological disorders that result from compression and decompression. Even though it is risky, the divers choose the job because they are paid well.

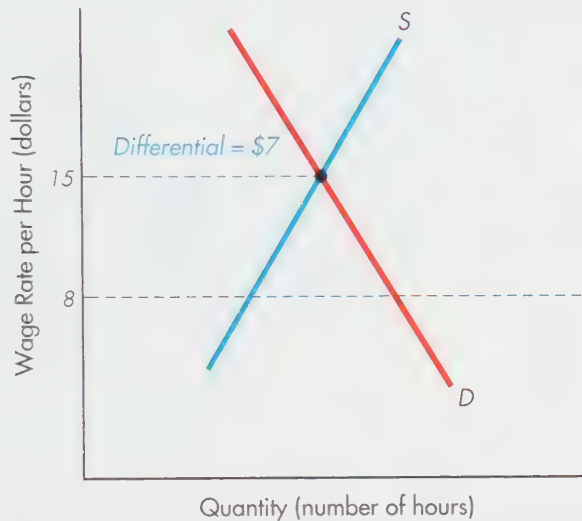
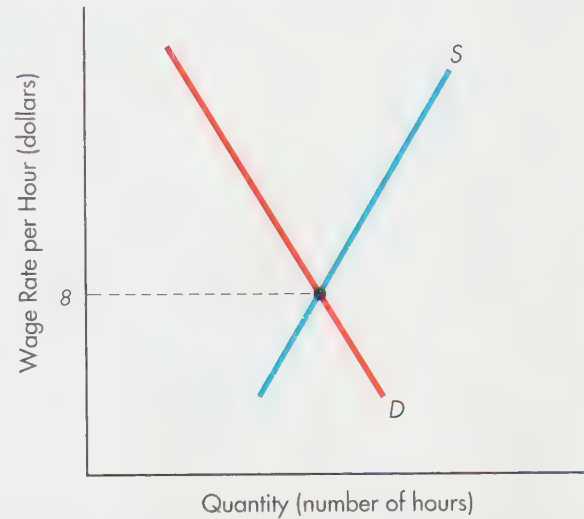
wage rate, fewer people are willing and able to work in the risky occupation than in the less risky occupation. Thus, if the demand curves are identical, the supply curve of the risky occupation will be to the left of the supply curve of the less risky occupation. As a result, the equilibrium wage rate is higher in the risky occupation (\$10) than in the less risky occupation (\$5). The difference between the wage in the risky occupation (\$10 per hour) and the wage in the less risky occupation (\$5 per hour) is an *equilibrium differential*—the compensation that a worker receives for undertaking the greater risk.

Commercial deep-sea divers are exposed to the dangers of drowning and severe physiological disorders that result from compression and decompression. They choose this job because they earn about 90 percent more than the average high school graduate. Coal miners in West Virginia and in the United Kingdom are exposed to coal dust, black lung disease, and cave-ins. They choose to work in the mines because the pay is twice what they could earn elsewhere. Wage differentials ensure that deep-sea diving jobs, coal-mining jobs, and jobs in other risky occupations are filled.

Any characteristic that distinguishes one job from another may result in a compensating wage differential. A job that requires a great deal of travel and time away from home usually pays more than a comparable job without the travel requirements because most people find extensive travel and time away from home to be costly. If people were indifferent to extensive travel, there would be no compensating wage differential.

## 2.b. Human Capital

People differ with respect to their training and abilities. These differences influence the level of wages for two reasons: (1) Skilled workers have higher marginal revenue products than unskilled workers, and (2) the supply of skilled workers relative to the demand

**FIGURE 4** Human Capital**(a) Skilled-Labor Market****(b) Unskilled-Labor Market**

Two labor markets are pictured. Figure 4(a) shows the market for skilled labor. Figure 4(b) shows the market for unskilled labor. The smaller supply in the skilled-labor market results in a higher wage there. The equilibrium differential between the wages in the two markets is the return to human capital.

for skilled workers is smaller than the supply of unskilled workers relative to the demand for unskilled workers. As a result, skilled labor generates higher wages than less skilled labor. In Figure 4, we illustrate the differences between the skilled and unskilled labor markets; the skilled labor market is shown to generate a wage of \$15 per hour, and the unskilled labor market a wage of \$8 per hour. The difference exists because the demand for skilled labor relative to the supply of skilled labor is greater than the demand for unskilled labor relative to the supply of unskilled labor.

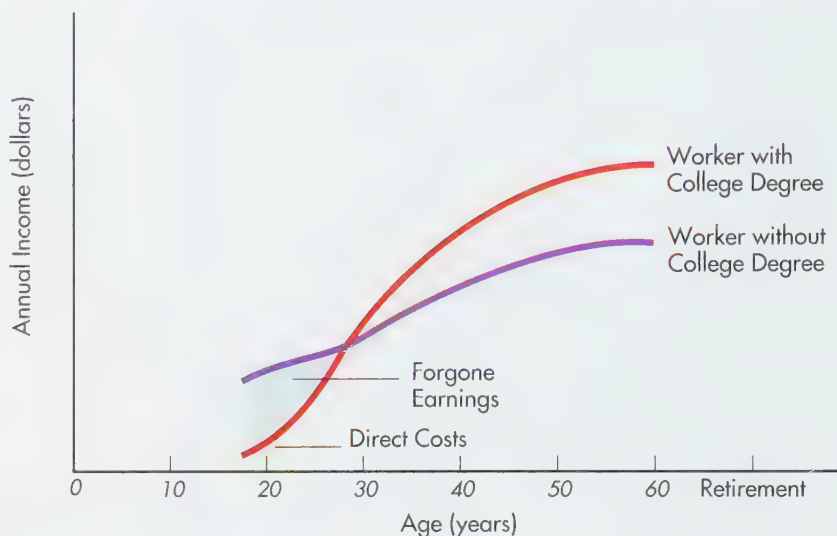
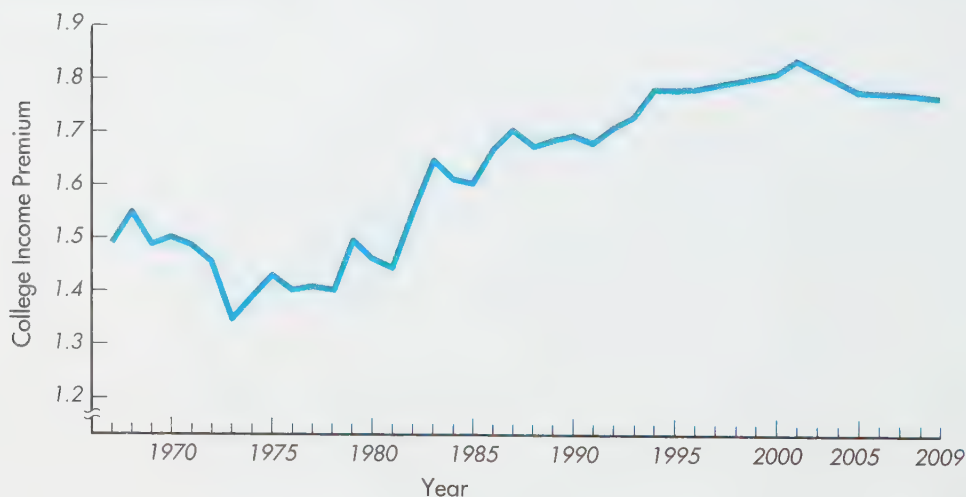
The expectation of higher income induces people to acquire **human capital**—skills and training acquired through education and job experience. People go to college or vocational school or enter training programs because they expect the training to increase their future income. These activities are *investments in human capital*. Like investments in real capital (machines and equipment), education and training are purchased in order to generate output and income in the future.

### human capital

Skills and training acquired through education and on-the-job training.

**2.b.1. Investment in Human Capital** Individuals who go to college or obtain special training expect the costs of going to college or obtaining the training to be more than offset by the income and other benefits they will obtain in the future. Individuals who acquire human capital reap the rewards of that human capital over time. Figure 5(a) is an illustration of what the income profiles of a worker with a college degree and a worker without a college degree might look like. We might expect the income of the worker without the degree to increase rapidly from the early working years until the worker gets to be about 50; then income might rise more slowly until the worker reaches retirement age. Until around age 30, the worker without the college degree clearly enjoys more income than the college-educated worker. The shaded areas represent estimated income lost to the college-educated worker while he or she is attending classes and then



**FIGURE 5** Income Profiles and Educational Level**(a) Profiles****(b) College Income Premium**

Income rises rapidly until age 50, then rises more slowly until retirement. Figure 5 compares the income earned by a worker without a degree with the income earned by a college graduate. Figure 5(a) suggests what the actual pattern looks like. Initially, the college graduate gives up substantial income in the form of direct costs and forgone earnings to go to college. Eventually, however, the income of the college graduate exceeds that of the high school-educated worker. Figure 5(b) illustrates the college income premium, the ratio of median income of college-educated to median income of non-college-educated individuals.

**Source:** Statistical Abstract of the United States, 2009; Economic Report of the President, 2009.

gaining work experience. It may take several years after entering the labor market for a college-degree recipient to achieve and then surpass the income level of a worker without a degree, but on average a college-educated person does earn more than someone without a college education. Figure 5(b) shows the ratios of the median income of

college-to-high school-educated workers. This is called the college income premium. As mentioned in the chapter “Economics: The World around You”, college-educated people earn more over their lifetimes than people without a college degree. This is their earnings, not their after-tax earnings or their after-debt-payment earnings. In some cases, the debt required to obtain a college degree may offset the college income premium.

The economic model of labor suggests that the reason that so many young adults go to college is that college-educated people have better-paying jobs and jobs with greater benefits and security than non-college-educated people.

**2.b.2. Choice of a Major** If you decide to attend college, you must then decide what field to major in. Your decision depends in part on the opportunity costs that you face. If your opportunity costs of devoting a great deal of time to a job are high, you may choose to major in a field that is not overly time-consuming. For instance, for several years after college, men and women who have studied to become medical doctors, lawyers, and accountants face long training periods and very long workdays, and they have to devote significant amounts of time each year to staying abreast of new developments in their profession. If you think that you are not likely to be willing to undertake and complete a four-or five-year apprenticeship after college in order to reap the rewards from your expenditure of time and money, then it would be very costly for you to be a premed student or to major in accounting or law. The greater the opportunity costs of any particular occupation, the smaller the number of people who will select that occupation, everything else the same. For instance, it takes more time, money, and effort to become a medical doctor than to become a teacher in the K–12 schools. For this reason, many more people choose to become teachers than choose to become doctors. As a result, there is a wage differential between the two fields that is sufficient to compensate those who become doctors for the extra opportunity costs of a medical career.

**2.b.3. Changing Careers** Today it is estimated that one in three people in the U.S. labor force will change careers at least once during their work lives. People choose a major and thus a career on the basis of the information they have at their disposal, family influences, and other related factors. People acquire additional information once they are involved in their occupation, and sometimes their tastes change. They decide to embark on another career path. Who will make such a change? What types of occupations might see more changes?

Relying on the labor market model, we can suggest some answers to these questions. There might be a temptation to say that those who devoted the most effort, time, and money to their first occupation would be the least likely to change. But it is the marginal cost that matters; the effort, time, and money that have been devoted to that first career are gone, whether one remains in the first occupation or moves to another. In the words of the chapter on monopolistic competition and oligopoly, these are sunk, or unrecoverable, costs. Thus, we would expect people who have the greatest expected net gains from a change to make that change. Those who see that they are in dead-end positions or in occupations whose outlook for future income increases is not as good as the outlook in other occupations are more likely to move to a new career. We might expect people not to remain in or enter those professions where the marginal costs of remaining in the profession are high. For instance, those occupations that require continuous time and/or financial commitments if their members are to remain productive, such as the high-tech occupations, the hard sciences, engineering, accounting, or law, might lose relatively more people to areas that do not require similar time and money expenditures, such as management and administration.



- 3 What is the impact of technological change on workers?



- 4 What is offshoring?

### outsourcing

The process in which one firm purchases services from another firm (rather than having the services performed in-house).

### offshoring

The process in which one firm purchases services from another firm in another country (rather than having the services performed in-house).

*Outsourcing is the process of purchasing services from another firm rather than employing someone to perform those services inside the firm. Outsourcing is called offshoring when the jobs are purchased from a firm in another country.*



- 5 What is the impact of a minimum wage law on unskilled labor?

**2.b.4. Outsourcing** The labor market adjusts to technological changes. New markets are created for highly skilled workers, and old markets are eliminated. The economy makes it possible for many jobs—ranging from routine clerical jobs like processing insurance claims and handling customer calls to positions in highly skilled occupations like software development and radiology—to be performed anywhere in the world, with the results being transmitted electronically to wherever they are demanded. So if the work can be done as well by another firm at a lower cost, companies will purchase the work from that firm. If firms in India or China can perform the work at a much lower price, companies in the United States and other developed nations will purchase the work from these countries. This is why an increasing number of IT jobs are being done offshore. This process is called **outsourcing** if the firm is located in the same country and **offshoring** if the firm is located in another country. For instance, rather than have a telephone receptionist sitting outside the main office of a firm's headquarters, a firm could pay to have the service provided by an Indian company that could do it at a fourth of the cost. Offshoring eliminates domestic jobs, but it also enables companies to reduce the prices of goods and services.

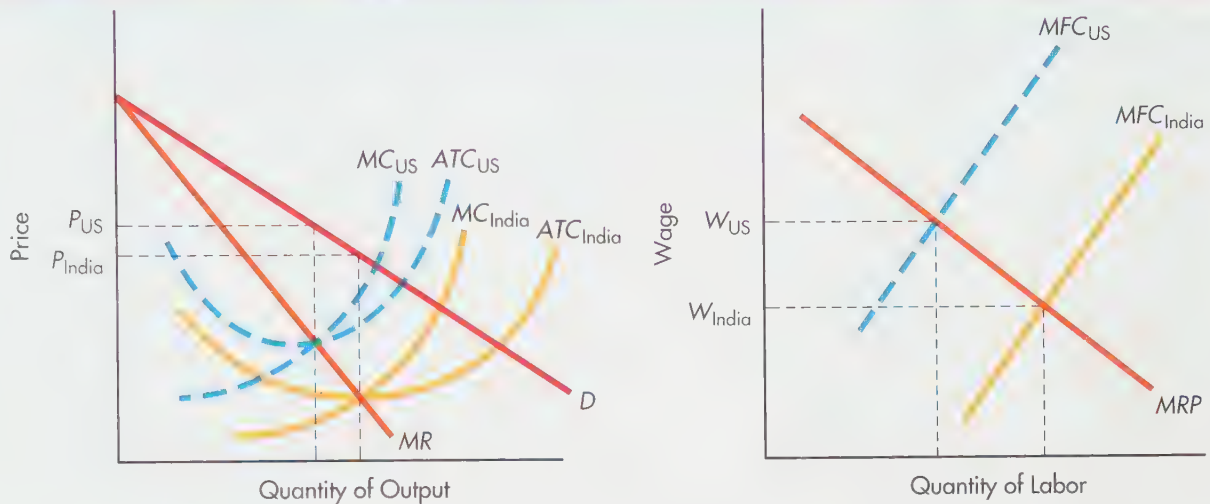
Outsourcing is not just something that U.S. firms do. Every developed country sends jobs to low-wage nations—India, Mexico, Latin America, and much of Asia. Studies have found that for each dollar a U.S. company spends offshore, it saves 58 cents; this translates into lower prices for the goods it produces. The lower prices enable customers to demand other goods and services and thus create jobs in other areas.

Figure 6 illustrates the dynamic process of offshoring jobs and its impact on prices of goods and services. Initially, the firm is hiring U.S. labor to produce its goods and/or services. The wage rate is indicated as  $W_{US}$  in the labor market. In the output market, the firm maximizes profit with its costs  $ATC_{US}$  and  $MC_{US}$  at the point where  $MR = MC_{US}$ . The resulting price that the firm charges is  $P_{US}$ . If the firm can obtain the same labor services from India at a much lower cost, its cost curves shift down to  $ATC_{India}$  and  $MC_{India}$ , and it prices its product at the point where  $MR = MC_{India}$ , or  $P_{India}$ , which is much lower than  $P_{US}$ . The demand for U.S. workers declines or disappears and is replaced by the demand for Indian workers. The lower prices for the goods and services in the United States enable customers to purchase other goods and services and increase the demand for workers in these other areas.

## 2.c. The Minimum Wage

Because the demand for highly skilled workers has increased and the demand for unskilled workers has not kept pace, the inequality of income has become greater. In the 1970s, a high school dropout was 3.5 times more likely to be unemployed than a college graduate; this is now more than 4.5 times. Those with a college degree now make about 74 percent more than those who have only a high school education, a figure that has nearly doubled since 1979. The unemployment rate for those who hold at least a bachelor's degree is 2.7 percent, compared with 8.3 percent for those without a high school diploma. Several politicians and others have argued that the minimum wage (the government-set price floor on wages) should be raised in order to ensure that unskilled workers can make a decent living. A minimum wage has existed in the United States since 1938, when it was set at \$.25 per hour. In 2009, the federal government minimum wage was set at \$7.25 per hour. Today, about 80 percent of all jobs that are not in agriculture are required to pay at least the minimum wage, although some are granted exemptions. States may have their own minimum wage if that wage exceeds the federal level. In 2009, the state of Washington's minimum wage was the highest at \$8.55 per hour. If cities are not happy with the level of either the federal or the state minimum wage, they may set their own. More than 100 cities have their own minimum wage



**FIGURE 6** The Dynamics of Offshoring

The U.S. firm has costs given by  $MC_{US}$  and  $ATC_{US}$  when using U.S. workers. These costs come from the cost of labor,  $W_{US}$ . The firm maximizes profit at  $MR = MC_{US}$  and sells the good at  $P_{US}$ . If the firm can obtain the same labor services from India, the firm's cost curves shift down to  $MC_{India}$  and  $ATC_{India}$ , and the firm maximizes profit at the point where  $MR = MC_{India}$ , or a price of  $P_{India}$ .

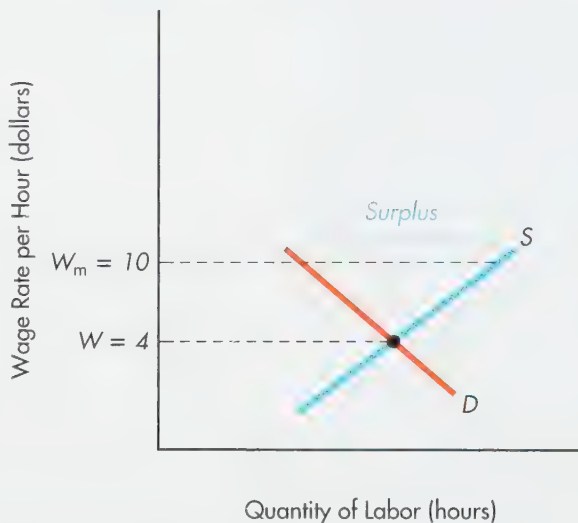
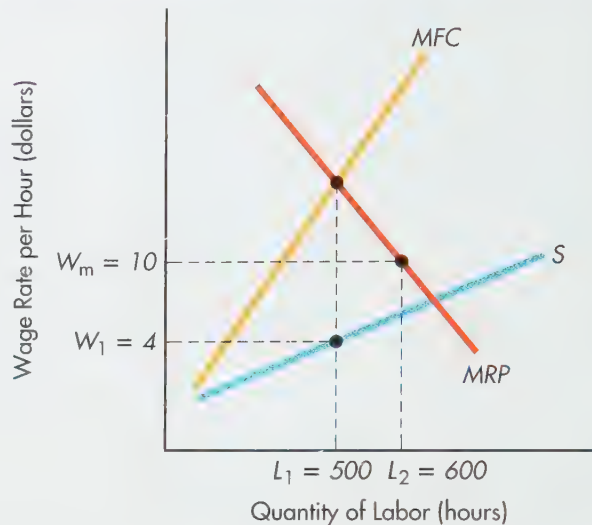
ordinances. In 2009, the highest effective rates were \$9.79 in San Francisco and \$9.49 in Santa Fe, New Mexico.<sup>1</sup>

The intention of a minimum wage is to raise the wage rate above the equilibrium level. Let's suppose that government wants a family to earn at least \$20,000 per year. This requires an hourly wage of \$10 per hour if it is assumed that a worker will spend 40 hours a week for 50 weeks a year at the job. So in Figure 7(a) the minimum wage ( $W_m$ ) is set at \$10, above the equilibrium wage ( $W$ ) of \$4. In markets such as the unskilled labor markets for agricultural workers, construction workers, and restaurant busboys, the minimum wage would create a labor surplus, as the quantity of jobs offered would be reduced and the quantity of people wanting jobs would increase.

While the minimum wage drives wages up for those who have a job, it hurts the chances of employment for others. Studies show that the minimum wage adversely affects teenagers the most and then affects those with the least skills or value to a firm. An increase in the minimum wage of 1 to 3 percent results in a 10 percent increase in teenage unemployment.

Notice that the market we discuss in Figure 7(a) is a perfectly competitive one. The  $MRP$  of all firms constitutes the demand for labor, and the  $MFC$  for all workers is the supply of labor. The minimum wage could have a different effect if just one employer, a monopsony, was hiring unskilled labor. If an employer is a monopsonist, a worker's wage ( $W$ ) is less than  $MRP$ . The imposition of a minimum wage set at a level that is less than  $MRP$  but greater than the wage rate that the monopsonistic firm wants to pay may actually increase the level of employment. Recall from the previous chapter that a monopsonist drives up the costs of all other workers when it hires one more—it does

<sup>1</sup> <http://www.paywizard.org/main/Minimumwageandvertime/>

**FIGURE 7** The Effect of Minimum Wage**(a) Competitive Labor Market****(b) Monopsonistic Labor Market**

In a competitive labor market, a minimum wage above equilibrium causes a surplus—that is, increases unemployment. This is shown in Figure 7(a). In a monopsonistic market, a minimum wage can increase both the wage and the employment rate, as shown in Figure 7(b). The wage rises from  $W_1 = \$4$  (the wage rate that the monopsonistic firm wants to pay) to  $W_m = \$10$ , the legal minimum wage; and the quantity of labor employed rises from  $L_1$  to  $L_2$ .

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not hire a worker at one wage and another identical worker at a different wage. The minimum wage limits the increase in marginal costs, and, as shown in Figure 7(b), at a  $W_m$  of \$10, employment actually rises. How important is this in the unskilled labor market? If labor is not mobile, and a single firm, such as a large agricultural firm, controls a particular region—say, the Yuma valley in Arizona—then could we think of the unskilled labor market in that region as being monopsonistic?



**6** What is the effect of income taxes on workers?

## 2.d. Income Taxes

Does a tax on income affect the supply of labor? The main types of taxes on individuals are income taxes, levied on a person's salary or wages, and consumption taxes, levied on consumer spending. These include sales taxes, used by many U.S. states, and the value-added tax, or VAT, widely used in Europe.

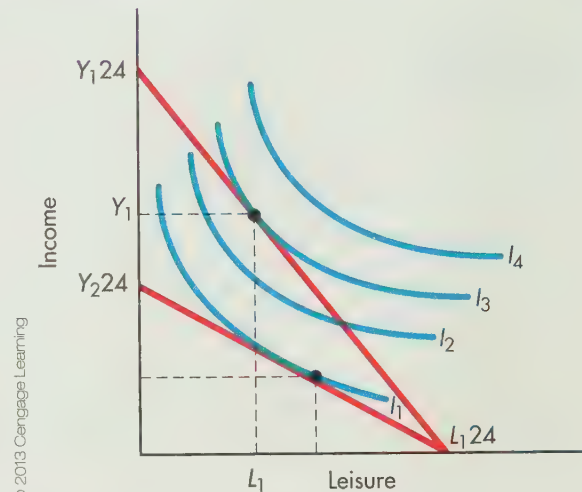
The simple rule of taxes is that when you tax something you get less of it. All taxes distort market decisions, affecting the buying and selling of goods and services. A tax on a good, for example, raises the price of the product, making it more expensive to purchase that good. However, if consumers buy less, forcing the market price down, then the tax affects sellers, who receive a lower price for their products. Whether buyers or sellers bear the greatest share of a tax burden is based on the concepts of supply and demand elasticity. As discussed in the chapter “Elasticity: Demand and Supply,” the most inelastic side of a market (supply or demand) will bear the greatest share of the tax burden. The demand for cigarettes, for example, is price-inelastic. A tax on cigarettes, then, will likely be borne mostly by smokers themselves, because they do not alter their smoking habits very much after the tax.

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## ECONOMIC INSIGHT

### Labor-Leisure and Income Taxes

In the Figure below, the income-leisure choices are shown. This is the same diagram as in the first Economic Insight in this chapter, except that we added the income lines. The income that can be earned for each hour spent on leisure is shown by what is called the "Income Constraint,"  $Y$ . As we move down  $Y$ , income is foregone in order to have more leisure time. Point " $Y_124$ " would represent 24 hours spent working; Point " $L_124$ " would represent 24 hours spent on leisure (zero income). As shown in the Appendix to the chapter "Consumer Choice," utility is maximized where the budget line is just touching or is tangent to an indifference curve. In the figure, the individual chooses income  $Y_1$  and leisure  $L_1$ . What happens when an income tax is levied? The income line rotates down from " $Y_124$ " to " $Y_224$ ." It rotates because 24 hours devoted to leisure still generates zero income, but 24 hours devoted to work generates income " $Y_124$ " less the income tax, or " $Y_224$ ." Under the income tax, the individual maximizes utility by choosing more leisure and less work.



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Taxes also affect incentives to work, earn, and invest, and this is what is of most concern in this chapter. For example, suppose a tax rate of 20 percent applies to all income up to \$50,000 a year, and income between \$50,000 and \$60,000 a year is taxed at a rate of 30 percent, and then income above \$60,000 is taxed at 40 percent. A person earning \$50,000 a year would pay \$10,000 in taxes; however, if that person earns an additional \$10,000 (\$60,000 a year total), that additional \$10,000 would be taxed at 30 percent, or \$3,000. Another \$10,000 in income would result in \$4,000 more additional taxes, a total of  $\$10,000 + \$3,000 + \$4,000 = \$17,000$ . This means that the cost of working becomes higher (and the cost of leisure lower) as income rises. At some point people might decide that it is not worthwhile to work more or perhaps they might decide to quit working altogether.

The example in the previous paragraph is a progressive tax. An income tax is progressive if the tax rate increases as income increases; the opposite of a progressive tax is a regressive tax—the tax rate decreases as income rises; a proportional income tax is one where the tax rate is constant, taking the same proportion of each income level.

A flat tax is a proportional tax where lower incomes are not taxed. For instance, the flat tax rate might be 20 percent. If the exempt income is \$50,000, no one earning less than \$50,000 is taxed. The distortions created by income taxes could be minimized by changing the progressive system to a flat tax. A flat tax would eliminate all deductions and exemptions and apply a fixed tax rate to income. In the case of the flat tax, as your income rises, you would pay the same tax rate. While many people support the idea of a flat tax, many think that a consumption-based tax would work better because it penalizes



consumption rather than work. A tax based on consumption rather than income would be collected at the cash register when people purchase goods and services, just like a national sales tax. The difference between a flat tax and a consumption tax is where the tax is collected. A flat tax is levied on income—but only once and at one low rate—as it is earned. A sales tax is levied on income—but only once and at one low rate—as it is spent.

## RECAP

1. Compensating wage differentials are wage differences that make up for the higher risk or poorer working conditions of one job over another. Risky jobs pay more than risk-free jobs, and unpleasant jobs pay more than pleasant jobs.
2. Human capital is the education, training, and experience embodied in an individual.
3. An individual's choice of an occupation reflects a trade-off between expected opportunity costs and expected benefits. An individual is likely to choose an occupation in which expected benefits outweigh expected opportunity costs.
4. A firm that used to have an accountant but then eliminated the accounting position and purchased its accounting services from another firm would be said to be outsourcing. Outsourcing refers to firm A purchasing from firm B something firm A used to do itself. If firm B is a foreign firm, outsourcing is called offshoring.
5. If the market is competitive, increasing the minimum wage benefits those who have and can retain jobs and harms those who are least skilled and have the least value to the firm.
6. If the employer is a monopsonist, a minimum wage set between supply and marginal factor cost can increase employment while increasing wages.
7. Income taxes distort the decision to work or take leisure time. A progressive tax tends to discourage additional work as income rises. A progressive income tax is one where the rate increases as income increases.
8. A regressive income tax is one where the tax rate decreases as income increases. A proportional income tax is one where the tax rate is constant as income rises.

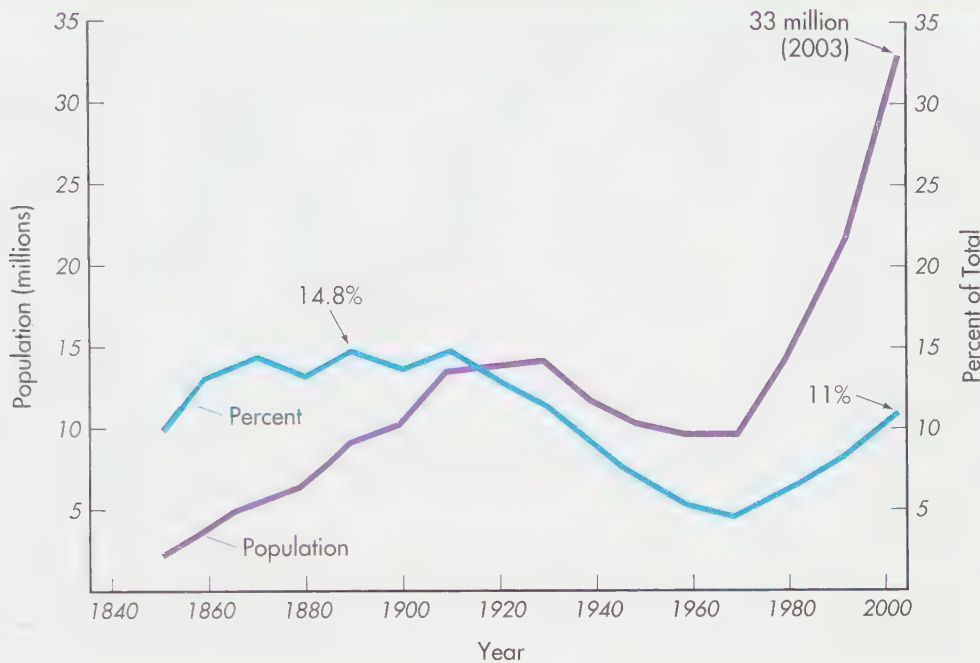
## 3. Immigration

Approximately 700,000 people cross legally into the United States from Mexico every day to shop and work, returning afterward to their homes in Mexico. About 3,500 people cross the border *illegally* every day, and many of them don't return to Mexico. In the United States, the illegal population from Mexico is estimated to be between 6 and 7 million. Another 3 to 4 million undocumented aliens living in the United States are from other Latin American countries and Asia. Why do so many people leave their home countries and migrate to the United States?

### 3.a. The United States Is a Nation of Immigrants

In Figure 8, you can see the pattern of legal immigration to the United States from about 1850. Immigration has not taken place at a steady pace, but instead has been cyclical, with peaks in the number of people coming to the United States from other countries occurring in 1870, 1920, and 2004–2005.

The amount of immigration relative to the existing population is also shown in Figure 8. The total foreign-born population as a percentage of the total U.S. population

**FIGURE 8** Foreign-Born Population of the United States

The foreign-born population of the United States in numbers and percentages is shown for the period from 1860 to 2000. The amounts (total numbers and percentages) rose until the early 1900s, then declined until the late 1960s and have risen since.

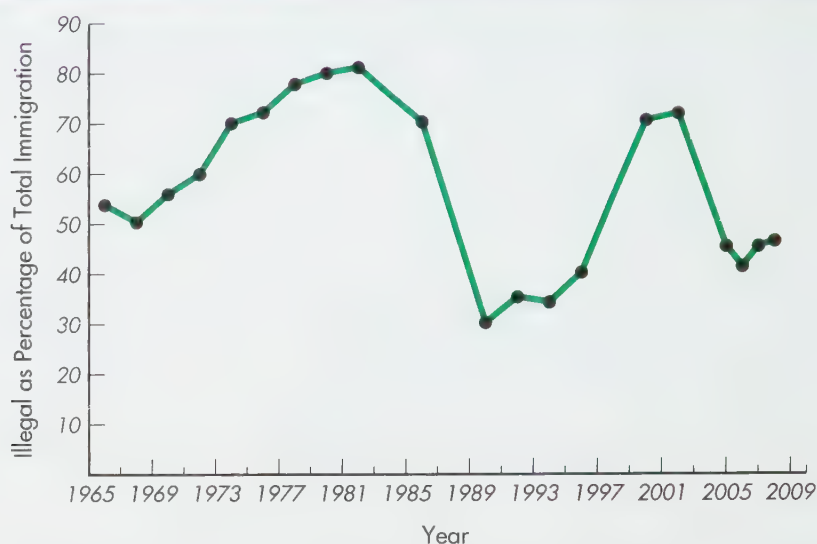
**Sources:** "Foreign-Born Population of the United States," *Current Population Survey*, March 2009, and previous years; <http://www.census.gov/population/www/socdemo/foreign/ppl-176.html>.

declined from a peak in 1880 and 1910 of about 15 percent to a low of 5 percent around 1970 and has risen since.

### 3.b. Why Immigrate?

People leave their home country and go to another country to live primarily because they seek a higher quality of life. Their own country may be politically repressive or economically stagnant, or there may be no upward mobility among income classes in their home country. For instance, most immigrants to the United States in the 1800s and 1900s were from northern and western Europe. Economic events like the potato famine in Ireland, recessions in the United Kingdom and western Europe, and religious persecution led to migrant flows to the United States. Beginning about 1950, immigration to the United States switched from being primarily from Europe to being mostly from Latin America and Asia. This was caused by changes in U.S. immigration policy and the relatively more severe political and economic problems in the Asian and Latin American countries.

For example, the greatest number of recent immigrants to the United States comes from Mexico. The reason: proximity and wage differentials. Compare incomes in Mexico with those in the United States—the per capita income in the United States is more than four times higher than that in Mexico.

**FIGURE 9** Illegal Immigration in the United States as a Percentage of Total Immigration

The number of illegal immigrants as a percentage of total immigrants is shown for the period 1965–2004. The percentage rose until the early 1980s, then declined until the mid-1990s and rose until the current period.

Source: <http://www.migrationinformation.org/Feature>.



**7** What is the effect of illegal immigration on the economy?

**3.b.1. Why Immigrate Illegally?** As Figure 9 shows, illegal immigration is a significant percentage of immigration and has been growing rapidly in the past few years. However, fewer than half of illegal immigrants cross the nation's borders clandestinely; most illegal immigrants enter legally and overstay their visas.

For much of U.S. history, there were few restrictions on immigration, so illegal immigration was not an issue. The first restriction was the Chinese Exclusion Act of 1882. Chinese immigrants had been brought in to work during the labor shortages of the 1840s, but they became increasingly disliked by the native unskilled laborers. The Chinese Exclusion Act suspended immigration of Chinese laborers for 10 years, removed the right of Chinese entrants to be naturalized, and provided for the deportation of Chinese who were in the United States illegally. It was not until 1943 that the Chinese exclusion laws were repealed. In 1924, the United States established a quota system specifying how many people from each country could immigrate to the United States each year. The law placed a ceiling of 150,000 per year on immigrants from Europe, completely barred immigrants from Japan, and based the admission of immigrants from other countries on the proportion of people of that national origin that were present in the United States as measured by the 1890 census. In 1965, the national origins quota system was replaced with a uniform limit of 20,000 immigrants per country for all countries outside the Western Hemisphere and a limit on immigration from the Western Hemisphere (most notably from Mexico). The Immigration Reform and Control Act of 1986 (IRCA) was the first to address the issue of illegal immigration. It introduced penalties for employers who knowingly hire illegal immigrants.

The United States currently admits about 700,000 immigrants annually as legal (“green card”) residents who will be eligible to apply for citizenship after living in the



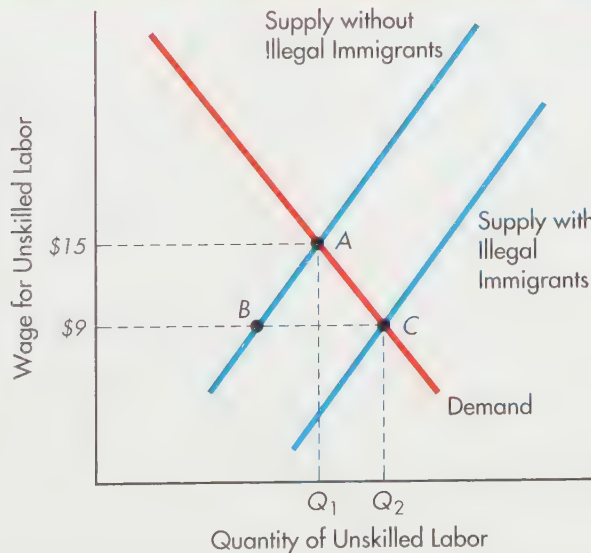
United States for five years. Only about 110,000 of those receiving green cards do not have family members who are U.S. citizens. Of these, about 65,000 are highly skilled workers on H1-B visas, and about 44,000 are low-skilled workers.

To understand what these developments mean, we need to look at the unskilled labor market as depicted in Figure 10. In Figure 10, the equilibrium wage is \$15 per hour if only legal immigrants and natives are considered. What happens when illegal immigration takes place? The supply of low-skilled labor rises—the supply curve shifts out—and the equilibrium wage drops to \$9 per hour. At \$9, fewer natives choose to work—the quantity supplied of native workers declines from *A* to *B*. The shortage of native workers, *B* to *C*, is made up by illegal immigrants.

Have you heard the claim that illegal immigrants take jobs that Americans won't take? Those making this claim are focusing on the distance from *B* to *C* in Figure 10. What they are not including in their discussion is the distance from *A* to *B* caused by the lower wage. What the claim actually should say is that illegal immigrants take jobs that Americans won't take at the wage rate for these jobs. If the wage rate was \$15, then enough native workers would be willing to work to match the quantity demanded. Yet that higher cost has economic effects on the goods and services produced by this unskilled labor.

Labor is a resource—it is used to produce goods and services, and the wages and salaries provided to workers are part of the costs of doing business. So when the cost of labor declines, the costs of doing business also decline. A typical firm will produce more and earn greater profits when its costs decline. As firms increase their output and new firms enter the business, the market supply of the products being produced by the unskilled labor will rise, and the market price of the good or service will decline. This is what happens with illegal immigration. Illegal immigration has reduced costs in certain businesses—construction, restaurants, agriculture, meatpacking, textiles, and poultry

**FIGURE 10** Unskilled Labor Market and Illegal Immigration



Without illegal immigrants, the equilibrium wage is \$15, and the equilibrium quantity is quantity  $Q_1$ . With illegal immigration, the supply increases and the wage rate declines to \$9. At \$9, there would be a shortage of  $B - C$  if no illegal immigrants supplied labor.

production in particular. The lower costs lead to lower prices for houses and buildings, child care, housekeeping, gardening, produce, poultry, meats, and restaurants.

### 3.c. Immigration Policy

Illegal immigration in the United States is one of the topics of greatest concern to the American public. The costs and benefits of illegal immigration have been examined in a number of studies. The costs include the effects of illegal immigration on unskilled workers; the property damage caused by immigrants sneaking into the United States; the expenditures on health care for immigrants at emergency clinics and hospitals, which are legally unable to deny care to anyone or to inquire whether someone is a legal resident; expenditures on public education for the children of immigrants who attend public schools; and burglaries and other crimes committed by illegal immigrants.

Benefits created by the illegal immigrants include the lower wages and thus the lower costs in the occupations they work as well as the taxes they pay. It is estimated that about three-fourths of illegal immigrants pay Social Security and other withholding taxes, but since an illegal immigrant must have fake identification and Social Security numbers, any payments made to Social Security will not be assigned to a potential recipient. Instead, when the Social Security number does not match the SSA's records, the payments go into a slush fund called the "suspense file." Since 2002, the suspense file has been growing by more than \$60 billion a year. The net effect of these costs and benefits varies according to the study, but most studies conclude that the first generation of illegal immigrants imposes costs that exceed the benefits they create, but every generation thereafter creates more benefits than it costs.

Those most affected by the benefits want immigrants to have a way to take a job, whereas those most affected by the costs want immigrants kept out of the country. Views on illegal immigration range from using the military to guard the borders and the construction of a fence along the border to amnesty for illegal aliens already in the United States.

**3.c.1. Enforcement of Borders** As illegal immigration has increased, so have government expenditures on border enforcement. Between 1986 and 2005, the U.S. Border Patrol more than tripled in size, and the hours spent patrolling increased more than eight times. In addition to the Border Patrol, the U.S. Customs Service and the Immigration and Naturalization Service have intensified their inspections, and the Drug Enforcement Agency (DEA) and the Bureau of Alcohol, Tobacco, and Firearms (BATF) have increased their presence. Border apprehensions increased from 200,000 in 1970 to more than 2 million in 2004, and yet the apprehension rate—apprehensions per total illegal crossings—declined because the number of crossings had increased more quickly. With the economic downturn in 2007–2009, the number of people illegally entering the United States declined.

What would be the effects of more intense border enforcement? In Figure 10, the supply curve would shift in to the supply without illegal immigrants curve as a result of the border enforcement. With fewer illegal immigrants, in order to hire people to work in restaurants and agricultural fields and other unskilled areas, firms would have to pay more. Suppose the wage is driven up to \$15. The firms that before the increased enforcement had employed the illegal unskilled workers would now have to pay more; their costs of doing business would rise and profits would decline. Those businesses that survive after the wage hike would not produce as much, and fewer firms would be in business. The market supply of the products created by unskilled labor would decline, and the prices of these products would rise.

## RECAP

1. Immigration has occurred throughout U.S. history. The highest annual rates of immigration were in the 1880s, the 1920s, and currently.
2. Immigration law began with the Chinese Exclusion Act of 1882; before that there were no restrictions. The current system has quotas assigned to countries—a certain number of people from each country can obtain visas.
3. The total number of legal immigrants each year is about 700,000. Most of them have family members who live in the United States. About 110,000 visas are given to people applying to work in the United States who don't have family members here. H1-B visas for highly skilled workers each year total about 65,000. Less than 45,000 visas are granted to unskilled workers.
4. The number of illegal immigrants entering each year has been growing since 1990; in 2004, the number of illegal immigrants exceeded the number of legal immigrants.
5. The impact of illegal immigrants on the labor market is to increase the supply of unskilled workers, which reduces the wage rate. The lower wage induces many native workers to leave the market—to refuse to work at the low wage. The lower wage is also a reduced cost for businesses employing illegal immigrants, and the lower cost means lower prices for the goods and services produced by the illegals.
6. Border enforcement, if effective, would reduce the number of unskilled workers and thereby drive up wages and the cost of business for firms that had been employing illegal immigrants. Consumers would be paying higher prices for the goods and services produced by the illegals.

## 4. Discrimination

What would you think if you found out that women earn only about 75 percent of what men earn, that African Americans earn only about 60 percent of what whites earn, or that there are pay differentials among Hispanics, Asians, African Americans, and whites? Would you think that this result was evidence of discrimination? Could the differentials be explained in any other way? We'll provide some answers in this section.

### 4.a. Definition of Discrimination

Is **discrimination** present when there is prejudice, or just when prejudice has harmful results? Consider a firm with two branch offices. One office employs only African Americans, and the other employs only whites. Workers in both branches are paid the same wages and have the same opportunities for advancement. Is discrimination occurring?

Is a firm that provides extensive training to employees discriminating when it prefers to hire young workers who are likely to stay with the firm long enough for it to recoup the training costs? Is a university economics department that has no African American faculty members guilty of discrimination if African American economists constitute only 1 percent of the profession? Would your answer change if the department could show that it advertised job openings widely and made the same offers to African Americans and whites? Clearly, discrimination is a difficult subject to define and measure.

From an economist's viewpoint, a worker's value in the labor market depends on the factors affecting the marginal revenue product. When a factor that is unrelated to marginal revenue product acquires a positive or negative value in the labor market, discrimination is occurring. In Figure 11, if  $D_m$  is the demand for males and  $D_f$  is the



- 8** Are discrimination and freely functioning markets compatible?

#### **discrimination**

Prejudice that occurs when factors unrelated to marginal revenue product affect the wages or jobs that are obtained.



**FIGURE 11** Discrimination

The curve  $D_m$  is the demand for males, and  $D_f$  is the demand for females. The two groups of workers are identical except in gender. The greater demand and the higher wage rate for males, even though males and females are equally productive, are due to discrimination.

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demand for females, and if males and females have identical marginal revenue products, then the resulting wage differences can be attributed to discrimination. Race, gender, age, physical handicaps, religion, sexual preference, and ethnic heritage are factors that can take on positive or negative values in the labor market and yet are unrelated to marginal revenue products.

#### 4.b. Theories of Discrimination

Wage differentials based on race or gender pose a theoretical problem for economists because the labor market model attributes differences in wages to demand and supply differences that depend on productivity and the labor-leisure trade-off. How can economists account for different pay scales for men and women, or for one race versus another, in the absence of differences in marginal productivity between sexes or races? They identify discrimination as the cause of the differences, even though they find discrimination difficult to rationalize because it is costly to those who discriminate.

In the freely functioning labor market, there is a profit to be made from *not* discriminating; therefore, discrimination should not exist. But because discrimination *does* exist, economists have attempted to find plausible explanations for it. They have identified two sources of labor market discrimination. The first is *personal prejudice*: Employers, fellow employees, or customers dislike associating with workers of a given race or sex. The second is *statistical discrimination*: Employers project certain perceived group characteristics onto individuals. Economists tend to argue that personal prejudice is not consistent with a market economy but have acknowledged that statistical discrimination can coexist with a market economy.

**4.b.1. Personal Prejudice** Certain groups in a society could be precluded from higher-paying jobs or from jobs that provide valuable human capital by personal prejudice on the part of employers, fellow workers, or customers.

**Employer Prejudice** If two workers have identical marginal revenue products and one worker is less expensive than the other, firms will want to hire the lower cost worker. If they do otherwise, profits will be lower than they need to be. Suppose white males and others are identically productive, but managers prefer white males. Then white males will be more expensive than women and minorities, and hiring white males will lower profits.

Under what conditions will lower profits as a result of personal prejudice be acceptable? Perhaps a monopoly firm can forgo some of its monopoly profit in order to satisfy the manager's personal prejudices, or perhaps firms that do not maximize profits can indulge in personal preferences. However, for profit-maximizing firms selling their goods in the market structures of perfect competition, monopolistic competition, or oligopoly, personal prejudice will mean a loss of profit unless all rivals also discriminate. Could firms form a cartel to discriminate? Recall from the discussion of oligopoly that cartels do not last long—there is an incentive to cheat—unless an entity like the government sanctions and enforces the cartel.

In the United States, well-meaning legislation intended to protect women actually created a situation in which women were denied access to training and education and thus were not able to gain the human capital necessary to compete for highly skilled, high-paying jobs. Until the 1960s, women were barred from jobs by legislation that attempted to protect them from heavy labor or injury. In reality, this legislation precluded women from obtaining certain kinds of human capital. Without this human capital, a generation or more of women were unable to obtain many high-paying jobs.

**Worker Prejudice** Workers may not want to associate with other workers of different races or sexes. White males may resist taking orders from females or sharing responsibility with a member of a minority group. White male workers who have these discriminatory preferences will tend to quit employers who employ women or minorities on a nondiscriminatory basis.

The worker prejudice explanation of discrimination assumes that white males are willing to accept lower-paying positions in order to avoid working with anyone other than a white male. Such discrimination is costly to those who discriminate.

**Consumer Prejudice** Customers may prefer to be served by white males in some situations and by minorities or women in others. If their preferences for white males extend to high-paying jobs such as physicians and lawyers, and their preferences for women and minorities are confined to lower-paying jobs like maids, nurses, and flight attendants, then women and minorities will be forced into occupations that work to their disadvantage.

This explanation of discrimination assumes that consumers are willing to pay higher prices in order to be served by a person of a specific race or gender. In certain circumstances and during certain periods of time, this may be true; but over wide geographic areas or across different nations and over long periods of time, consumer prejudice does not appear to be a very likely explanation of discrimination.

Be sure you recognize that economists are not saying that discrimination based on personal prejudice never occurs. They are saying that when it does occur, it costs the person doing the discriminating.

*Discrimination might occur if employers attempt to hire only certain kinds of workers, employees attempt to work only with certain kinds of coworkers, or customers attempt to purchase goods and services only from certain kinds of workers. Discrimination is costly in that either less productive employees are used or more expensive but not more productive employees are used.*

**4.b.2. Statistical Discrimination** Discrimination that is not related to personal prejudices can occur because of a lack of information. Employers must try to predict the potential productivity of job applicants, but rarely do they know what a worker's actual productivity will be. Often, the only information that is available when they hire

**statistical discrimination**

Discrimination that results when an indicator of group performance is incorrectly applied to an individual member of the group.

**crowding**

Forcing members of a group into certain kinds of occupations.

**occupational segregation**

The separation of jobs by sex.

someone is information that may be imperfectly related to productivity in general and may not apply to a particular person at all. Reliance on indicators of productivity such as education, experience, age, and test scores may keep some very good people from getting a job and may result in the hiring of some unproductive people. This is called **statistical discrimination**.

Suppose two types of workers apply for a word-processing job: those who can process 80 words per minute and those who can process only 40 words per minute. The problem is that these actual productivities are unknown to the employer. The employer can observe only the results of a five-minute word-processing test that is given to all applicants. How can the employer decide who is lucky or unlucky on the test and who can actually process 80 words per minute? Suppose the employer discovers that applicants from a particular vocational college, the DeVat School, are taught to perform well on preemployment tests, but that their overall performance as employees is the same as that of the rest of the applicants—some do well and some do not. The employer might decide to reject all applicants from DeVat because the good and bad ones can't be differentiated. Is the employer discriminating against DeVat? The answer is yes. The employer is using statistical discrimination.

Let's extend this example to gender.

## 4.c. Occupational Segregation

Statistical discrimination and imperfect information can lead to **crowding**—forcing women and members of minority groups into occupations where they are unable to obtain the human capital necessary to compete for high-paying jobs. Today, even in the United States and other industrialized nations, some occupations are considered women's jobs and other occupations are considered men's jobs. This separation of jobs by sex is called **occupational segregation**.

One reason for occupational segregation is differences in the human capital acquired by males and females. Much of the human capital portion of the discrepancy between men and women is due to childbearing. Data suggest that marriage and children handicap women's efforts to earn as much as men. Many women leave the labor market during pregnancy, at childbirth, or when their children are young. These child-related interruptions are damaging to subsequent earnings because three out of four births occur to women before the age of thirty, the period in which men are gaining the training and experience that lead to higher earnings later in life. Second, even when mothers stay in the labor force, responsibility for children frequently constrains their choice of job: They accept lower wages in exchange for shorter or more flexible hours, a location near home, limited out-of-town travel, and the like. Third, women have a disproportionate responsibility for child care and often have to make sacrifices that men do not have to make. For instance, when a couple has a young child, the woman is more likely than the man to be absent from work, even when the man and woman have equal levels of education and wages.

Perhaps most important of all, because most female children are expected to become mothers, they have been less likely than male children to acquire marketable human capital while in school. In the past, this difference was reflected in the choice of a curriculum in primary and secondary schools, in a college major, and in the reluctance of females to pursue graduate school training or to undergo the long hours and other rigors characteristic of apprenticeships in medicine, law, business, and other financially rewarding occupations. Females were channeled into languages, typing, and home economics, while males were channeled into mechanical drawing, shop, chemistry, and physics. This situation is changing, but the remnants of the past continue to influence the market.



## ECONOMIC INSIGHT

### Pay and Performance

In 2010, Tiger Woods earned over \$100 million. Although he was the highest-paid athlete that year, most professional athletes earn pretty good incomes; the 10 highest-paid athletes earned more than \$15 million each. This seems small compared to the income of some celebrities: Oprah Winfrey pulled in \$275 million; and many others exceeded \$90 million. Why do these people make so much money? One explanation is called the superstar effect.

If you own a firm and an employee generates a huge income for you, you'd be willing to pay that employee a high salary. Similarly, if an athlete is bringing in fans or a performer is increasing the numbers of viewers, the owners of the firm that employs that person will willingly pay him or her a high salary. So athletes, celebrities, and TV performers are paid a lot because they make their employers lots of money. Yet some athletes make a lot more money than other athletes, and a few celebrities make a lot more money than others, even though their appeal to the public is not much different. The reason is that the public has limited time to devote to watching sports or television shows. As a result, they watch the best, even if the best is only slightly better than others.

Sometimes small differences in ability translate into huge differences in compensation. The playing ability of the top tennis players or golfers is not much better than the playing ability of the players ranked between 40 and 50. Nonetheless, the differences in compensation and in the demand for the top performers are incredibly large. If you watch golf tournaments, you will notice that huge throngs surround Tiger Woods, while lesser-known players play the

game without the attention of adoring fans. In a similar manner, people choosing among television shows must select one over others, so if Oprah Winfrey is just slightly preferred to other personalities, she will draw thousands more viewers than a competing personality. The demand for the superstars is huge relative to the demand for the lesser-ranked players or personalities.

This effect may also explain big pay differences among attorneys, physicians, and even economists. Two lawyers of relatively equal ability may earn significantly different fees, or two economic consultants with apparently similar abilities may earn vastly different consulting fees. Consider the economist who offers advice to lawyers in cases involving firm behavior. The outcome of a lawsuit filed against a firm might involve billions of dollars. Even if the differences between economists are very small, if hiring the better economist means a win, then the better economist will receive huge compensation relative to the lesser economist. A \$40 billion victory means that the value of the better economist is significantly greater than the value of the lesser economist.

If new female entrants into the labor force have human capital equal to the human capital of new male entrants and thus greater than the human capital of females who are already in the labor force, then the average human capital and wages of females will rise. But even though the wage gap between males and females is decreasing, a gap will continue to exist because the average male in the labor force has more marketable human capital than the average female. The average rate of pay of males will continue to exceed that of females.

Since the late 1970s, about half of all law school classes and about one-half of medical school classes have been female. Nonetheless, mostly females major in languages, literature, education, and home economics, while mostly males major in physics, mathematics, chemistry, and engineering.

#### 4.d. Wage Differentials and Government Policies

Not until the 1960s did wage disparities and employment practices become a major public policy issue in the United States. In 1963, the Equal Pay Act outlawed separate pay scales for men and women performing similar jobs, and Title VII of the 1964 Civil Rights Act prohibited all forms of discrimination in employment.

Prior to the 1960s, sex discrimination was officially sanctioned by so-called protective labor laws, which limited the total hours that women were allowed to work and prohibited them from working at night, lifting heavy objects, and working during

pregnancy. The argument was that women were not strong enough to do certain jobs. Interestingly, if you look at the supporters of these laws, they were the people who worked in the jobs that women were being kept out of. With the Civil Rights Act of 1964, it became unlawful for any employer to discriminate on the basis of race, color, religion, sex, or national origin. Unions also were forbidden from excluding anyone on the basis of those five categories. Historically, it had been very difficult for members of racial minorities to obtain admission into unions representing workers in the skilled trades. This exclusion prevented members of racial minorities from obtaining the human capital necessary to compete for higher-paying jobs.

The Civil Rights Act applied only to actions after its effective date, July 1, 1965. It also permitted exceptions in cases where religion, sex, or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of a business. This qualification might apply to certain jobs in religious organizations, for example. In addition, the act permits an employer to differentiate wages and other employment conditions on the basis of a bona fide seniority system, provided that such differences are not the result of an intention to discriminate. As a result of these exceptions, the Civil Rights Act has had neither as large nor as quick an impact on wage and job differentials as many had anticipated. It has, however, led to a clearer definition of discrimination.

Two standards, or tests, of discrimination have evolved from court cases: disparate treatment and disparate impact. **Disparate treatment** means treating individuals differently because of their race, sex, color, religion, or national origin. The difficulty created by this standard is that personnel policies that appear to be neutral because they ignore race, gender, and so on may nevertheless continue the effects of past discrimination. For instance, a seniority system that fires first the last person hired will protect those who were historically favored in hiring and training practices. Similarly, a practice of hiring by word of mouth will perpetuate past discrimination if current employees are primarily of one race or sex.

This concern with perpetuating past discrimination led to the second standard, **disparate impact**. Under this standard, it is the result of different treatment, not the motivation, that matters. Thus, statistical discrimination is illegal under the impact standard even though it is not illegal under the treatment standard.

**4.d.1. Comparable Worth** The persistent wage gap between men and women in particular, but also between white males and minorities, has prompted well-meaning reformers to seek a new remedy for eliminating the gap—laws requiring companies to offer equal pay for jobs of comparable worth. **Comparable worth** is a catchword for the idea that pay ought to be determined by job characteristics rather than by supply and demand, and that people in jobs with comparable requirements should receive comparable wages.

To identify jobs of comparable worth, employers would be required to evaluate all of the different jobs in their firms, answering questions such as these: What level of formal education is needed? How much training is necessary? Is previous experience needed? What skills are required? How much supervision is required? Is the work dangerous? Are working conditions unpleasant? By assigning point values to the answers, employers could create job classifications based on job characteristics and could pay comparable wages for jobs with comparable “scores.” A firm employing both secretaries and steelworkers, for example, would determine the wages for these jobs by assessing job characteristics. If the assessment showed that secretaries’ work was comparable to that of steelworkers, then the firm would pay secretaries and steelworkers comparable wages.

Proponents of comparable worth claim that market-determined wages are inappropriate because, as a result of statistical discrimination, team production, and personal prejudice, the market is unable to assess marginal products. They argue that mandating

#### **disparate treatment**

Different treatment of individuals because of their race, sex, color, religion, or national origin.

#### **disparate impact**

An impact that differs according to race, sex, color, religion, or national origin, regardless of the motivation.

#### **comparable worth**

The idea that pay ought to be determined by job characteristics rather than by supply and demand, and that people in jobs with comparable requirements should receive comparable wages.

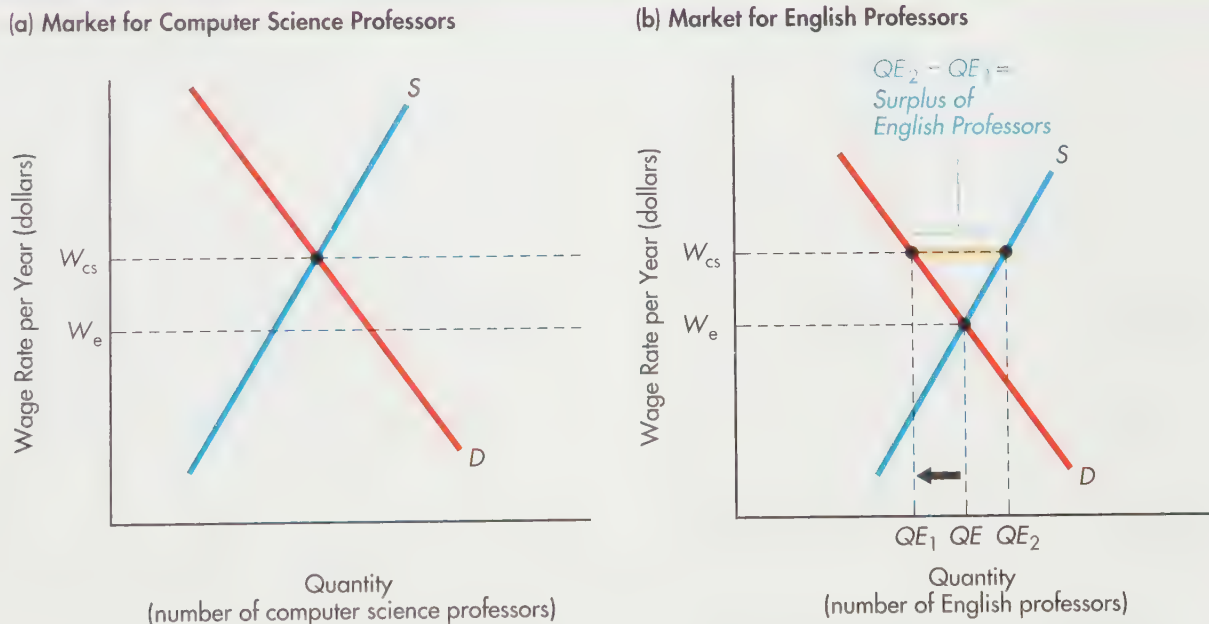


a comparable worth system would minimize wage differentials resulting from statistical discrimination and occupational segregation, and they charge that a freely functioning market will continue to misallocate pay.

Opponents of comparable worth argue that interfering with the functioning of the labor market will lead to shortages in some occupations and excess supplies in others. For instance, Figure 12 shows two markets for university professors, a market for computer science professors and a market for English professors. The supply and demand conditions in the two markets determine a wage for English professors that is less than the wage for computer science professors. The wage differential exists even though professors in both disciplines are required to have a PhD and have essentially the same responsibilities.

Advocates of comparable worth would say that the two groups of professors should earn the same wage, the wage of the computer science professors,  $W_{cs}$ . But at this wage there would be a surplus of English professors,  $QE_2 - QE_1$ . The higher wage would cause the university to reduce the number of English professors it employs, from  $QE$  to  $QE_1$ . The net effect of comparable worth would be to reduce the number of English professors employed, but to increase the wages of those who were employed. The policy would also have a detrimental effect in the future. The wage would send an incorrect signal to current college students. It would tell them to remain in English instead of forgoing English for computer science.

**FIGURE 12** Comparable Worth



Two markets are shown, a market for computer science professors and a market for English professors. Demand and supply conditions determine that the wages for computer science professors are higher than the wages for English professors. Proponents of comparable worth might argue that the wages of both groups of professors should be equal to the higher wages of computer science professors, since the requirements and responsibilities of the two jobs are virtually identical. However, the effect of imposing a higher wage in the market for English professors,  $W_{cs}$ , is to create a surplus of English professors,  $Q_{E2} - Q_{E1}$ . In addition, the higher wage sends the signal to current college students that majoring in English will generate the same expected income as majoring in computer science. Students who might have studied computer science turn to English. In the future, an excess of English professors remains and even grows, while the number of computer science professors shrinks.



Comparable worth has not fared well in U.S. courtrooms. On the whole, U.S. federal courts have not accepted the notion that unequal pay for comparable jobs violates existing employment discrimination law. Perhaps not surprisingly, therefore, the concept has made little headway in the private sector. It has had greater success in the public sector at the local and state levels. In Colorado Springs, San Jose, and Los Angeles, and in Iowa, Michigan, New York, and Minnesota, pay adjustments have been made on the basis of comparable worth. More than two-thirds of the state governments have begun studies to determine whether the compensation of state workers reflects the worth of their jobs. Why has comparable worth had more success in the government sector? State governments suffer from the problem of team production, and if personal prejudice is to occur, it is more likely to occur in nonprofit organizations such as government, where firms do not employ to the profit-maximizing point where  $MFC = MRP$ . Thus, it is in the state, local, and federal governments that comparable worth can be an effective policy. Comparable worth was adopted nationwide in Australia in the early 1970s, and aspects of it have arisen in parts of the United Kingdom.

## RECAP

1. Discrimination occurs when factors unrelated to marginal physical product acquire a positive or negative value in the labor market.
2. Earnings disparities may exist for a number of reasons, including personal prejudice, statistical discrimination, and human capital differentials. Human capital differentials may exist because of occupational choice, statistical discrimination, or unequal opportunities to acquire human capital.
3. There are two general classes of discrimination theories: prejudice theory and statistical theory. Prejudice theory claims that employers, workers, and consumers express their personal prejudices by, respectively, earning lower profits, accepting lower wages, and paying higher prices. Statistical discrimination theory asserts that firms have imperfect information and must rely on general indicators of marginal physical product when they pay wages and hire people, and that reliance on these general indicators may create a pattern of discrimination.
4. Occupational segregation is the separation of jobs by sex. Some jobs are filled primarily by women, and other jobs are filled primarily by men.
5. The first national antidiscrimination law was the Civil Rights Act of 1964. It forbade firms from discriminating on the basis of sex, race, color, religion, or national origin.
6. Two tests of discrimination have evolved from court cases. According to the disparate treatment standard, it is illegal to intentionally treat individuals differently because of their race, sex, color, religion, or national origin. According to the disparate impact standard, it is the result, not the intention, of actions that is illegal.
7. Comparable worth is the idea that jobs should be evaluated on the basis of a number of characteristics, and that all jobs receiving the same evaluation should receive the same pay, regardless of demand and supply conditions. Proponents argue that comparable worth is a solution to a market failure problem. Opponents argue that it will create surpluses and shortages in labor markets.

## SUMMARY

1. Are people willing to work more hours for higher wages?
  - The individual labor supply curve is backward bending because at some high wage, people choose to enjoy more leisure rather than to earn additional income. §1.a
2. What are compensating wage differentials?
  - Equilibrium in the labor market defines the wage and quantity of hours worked. If all workers and all jobs were identical, then one wage would prevail. However, because jobs and workers differ, there are different wages. §1.c

- A compensating wage differential exists in situations where a higher wage is determined in one labor market than in another because of differences in job characteristics. §2.a
- Human capital is the training, education, and skills that people acquire. Human capital increases productivity. Because acquiring human capital takes time and money, the necessity of obtaining human capital for some jobs reduces the supply of labor to those jobs. §2.b

### 3. What is the impact of technological change on workers?

- Technological changes occurring in information and knowledge transmission and development increases the demand for skilled workers and reduces that for unskilled workers. §2.b.4

### 4. What is offshoring?

- The ability to transmit information quickly almost anywhere in the world enables firms to seek out the least costly resources wherever they are located, and thus to have many jobs performed at a lower price in a less developed country, with the output being transmitted back to the firm in a developed country. This is called offshoring. §2.b.4
- The ability to use offshoring to produce goods and services at lower prices enables firms to reduce prices on these goods and services. §2.b.4

### 5. What is the impact of a minimum wage law on unskilled labor?

- The minimum wage in the United States is currently more than \$7 per hour. States and individual cities can set a higher wage. §2.c
- The objective of a minimum wage law is to ensure that the poor are able to earn a decent living. §2.c
- The effect of a minimum wage is to create a labor surplus because it reduces the quantity of jobs offered and increases the number of people who want a job. A minimum wage has an effect only if it is higher than the equilibrium wage, thereby acting as a wage floor. §2.c
- Should a labor market be monopsonistic, a minimum wage could increase employment because it reduces the marginal cost of hiring another worker. §2.c

### 6. What is the effect of income taxes on workers?

- A simple rule of thumb is that when you tax something you get less of it. When you tax work, you get less of it. §2.d
- Income taxes can be progressive, proportional, or regressive. A progressive income tax is one where the tax rate increases as income increases; a regressive income tax is the opposite of a progressive income tax; and a proportional income tax is one where the tax rate is constant as income rises. §2.d
- A flat tax is a proportional tax on income except that the lower income levels are exempted from paying the tax. §2.d
- A consumption tax is a tax imposed on consumption rather than income. §2.d

### 7. What is the effect of illegal immigration on the economy?

- It is primarily those without skills who immigrate illegally. U.S. immigration policy allows only about 65,000 skilled workers to obtain visas each year. Only about 45,000 unskilled workers can obtain legal entry. All other workers must enter the United States illegally. §3.b.1
- An increase in unskilled labor causes the wage rate of unskilled labor to decline. This reduces the willingness to work for many native workers who would have earned more had there been no illegal immigration. §3.b.1
- The lower costs that result from illegal immigration carry over into the prices of the goods and services produced by illegal immigrants. Without illegal immigration, prices of agricultural products, poultry, meat, textiles, and home services would be as much as 25 percent higher. §3.b.1

### 8. Are discrimination and freely functioning markets compatible?

- Earnings disparities may result from discrimination, occupational choice, human capital differences, educational opportunity differences, age, and immigration. §4.a, 4.c
- Discrimination occurs when some factor that is not related to marginal revenue product affects the wage rate someone receives. §4.a
- There are two general types of discrimination—personal prejudice and statistical discrimination. §4.b

- Personal prejudice is costly to those who demonstrate the prejudice and should not last in a market economy. For it to last, some restrictions on the functioning of markets must exist. §4.b.1
- Statistical discrimination is the result of imperfect information and can occur as long as information is imperfect. §4.b.2
- Occupational segregation exists when some jobs are held mainly by one group in society and other jobs are held by other groups. A great deal of occupational segregation exists between males and females in the United States. §4.c

## KEY TERMS

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## EXERCISES

1. What could account for a backward-bending labor supply curve?
2. What is human capital? Is a college degree considered to be human capital?
3. Define equilibrium in the labor market. Illustrate equilibrium on a graph. Illustrate the situation in which there are two types of labor, skilled and unskilled.
4. Describe how people choose a major in college. If someone majors in English literature knowing that the starting salary for English literature graduates is much lower than the starting salary for accountants, is the English literature major irrational?
5. What is the difference between legal and illegal immigration?
6. What is the effect of immigration laws restricting the number of immigrants?
7. Explain what is meant by discrimination, and explain the difference between personal prejudice and statistical discrimination.
8. How does technological change benefit firms? Does it benefit workers?
9. Explain what outsourcing is. Explain what offshoring is. Do you believe that unemployment is being created by CEOs who send jobs to less-developed nations such as India and China?
10. Explain why occupational segregation by sex might occur. Can you imagine a society in which you would not expect to find occupational segregation by sex? Explain. Would you expect to find occupational segregation by race in most societies?
11. Why are women's wages only 60 to 80 percent of men's wages, and why has this situation existed for several decades? Now that women are entering college and professional schools in increasing numbers, why doesn't the wage differential disappear?
12. Why do economists say that discrimination is inherently inefficient and therefore will not occur in general?
13. Demonstrate, using two labor markets, what is meant by comparable worth. What problems are created by comparable worth? Under what conditions might comparable worth make economic sense? Explain.
14. Consider a working woman or man who has young children or elderly relatives to take care of. Explain in terms of the labor supply curve how this person's decision to work is affected by the presence of dependents. What happens to the opportunity cost of working? How is the labor supply curve affected?
15. Demonstrate how a minimum wage affects the unskilled labor market. Is the labor market perfectly competitive? Can you find any examples of monopsonistic hiring? What would a minimum wage do in a monopsonistic market?
16. If a progressive income tax discourages additional work as income rises, what would a regressive tax do?
17. Use the indifference curves and income constraints discussed in the Economic Insights to illustrate the effect on work when income taxes are reduced.

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



## OBES WORKERS GETTING SMALLER PAY; STANFORD STUDY TIES LOWER WAGES TO HIGHER HEALTH CARE COSTS

*San Francisco Chronicle, May 12, 2005*

**E**mployers may be compensating for the expected higher health costs of obese workers by giving them slimmer paychecks, according to a just released study.

Previous studies have shown that severely overweight workers get paid less than other employees. But in the latest look at the issue, researchers at Stanford University have found that the pay gap exists only in workplaces with employer-paid health insurance.

"We view this as evidence that the higher expected expense of obese people is being passed along in the form of lower wages," said study coauthor Kate Bundorf, assistant professor of health research and policy at Stanford.

The study was published online as a working paper on the Web site of the National Bureau of Economic Research, a nonprofit Massachusetts research organization.

Nearly 59 million Americans are classified as obese. Medical spending attributed to excess weight was estimated at about \$92.6 billion in 2002 dollars, according to research published in 2003. That study found yearly medical expenses are \$732 higher on average for obese people than for people of normal weight.

Many assume that normal-weight workers are sharing the

medical costs of such obesity-related conditions as diabetes and hypertension, Bundorf said. Her research suggests that obese workers are paying these costs themselves by collecting smaller paychecks.

According to the Stanford survey, obese people with health coverage were paid an adjusted average of \$1.20 less per hour than non-obese workers during the study period of 1989 through 1998, with the amount rising incrementally to \$2.58 in 1998. That suggests the gap widened as workers aged, the authors said.

The study used older data from a Bureau of Labor Statistics youth survey because it contained detailed information about employees' height, weight and health, as well as their jobs, wages and education.

Researchers compared hourly wages of obese and non-obese workers, factoring in experience and job type. They found no significant difference when comparing the wages, retirement and life insurance benefits of obese and non-obese workers whose employers did not provide health insurance. But there was a discrepancy among workers whose employers offered health insurance.

The study did not address whether employers intentionally

adjusted wages for obese workers to account for health costs.

San Francisco resident Marilyn Wann, a board member of the National Association to Advance Fat Acceptance, said the study shows that obese people face bias on the job.

"For anyone to act like there isn't that discrimination, which is pervasive and unchallenged ... it is completely ridiculous," Wann said.

But Paul Fronstin of the Employee Benefit Research Institute in Washington said he doubts that employers would risk litigation by deliberately paying obese workers less.

"They are very hesitant about any type of discrimination, be it weight, age or racial discrimination," he said.

An increasing number of employers are battling fat in the workplace by offering programs to promote weight loss, noted Lisa Horn with the Society for Human Resource Management in Alexandria, Va.

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**C**ompensating wage differentials refers to the differences in pay that result from differences in the characteristics of jobs or job conditions. For instance, an identical person working at a risky job would earn more than one working at a less risky job. The reason is that the worker has to be compensated for taking the risk. As shown in the first figure, it is the marginal factor cost ( $MFC$ ) that is higher.

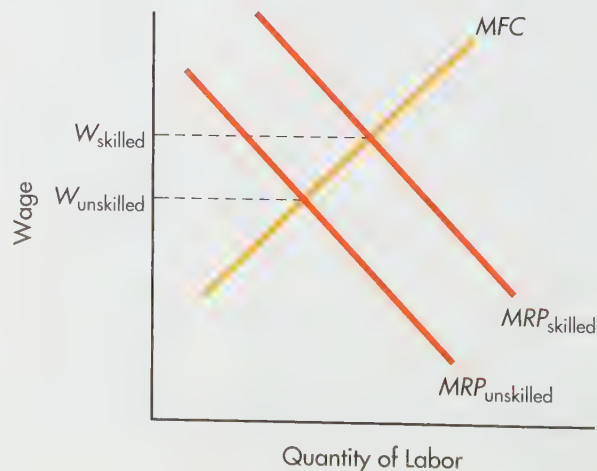
The other factor that enters into wage differentials is productivity. People are paid according to their contribution to the firm's profits, the marginal revenue product ( $MRP$ ). If a person has skills that enable him or her to be more productive, then he or she will be paid more, as shown in the second figure.

So how could one's weight be a factor in pay? What does the finding that *the pay gap exists only in workplaces with employer-paid health insurance* have to do with pay differentials? It has to do with the marginal factor cost. In addition to salaries, many firms also pay for workers' health insurance, retirement benefits, disability insurance, and other benefits. Firms are choosing to allocate their per employee expenditure for wages and benefits so that total pay per individual is the same. Suppose that the salary for a normal-weight person is \$10 per hour and benefits are \$9 per hour, including \$4 for health insurance, for a total expenditure of \$19 per hour. To maintain the same \$19 total

expenditure per employee and yet pay \$5 for health insurance, the firm would have to pay \$9 salary and \$10 benefits.

Yet Marilyn Wann, a board member of the National Association to Advance Fat Acceptance, said that the study shows that obese people face bias on the job. She stated, "For anyone to act like there isn't that discrimination, which is pervasive and unchallenged ... is completely ridiculous." Is this discrimination?

Discrimination occurs when marginal revenue product is the same and pay is not for any given marginal factor cost. Pay is not different here if total pay includes salary and benefits and the firm has merely shifted categories and not changed the total. However, the study also said that the pay differential exceeds the marginal cost of insuring the obese individual. If that is the case and the  $MRP$  is the same, we could say that there does appear to be discrimination against obese people. On the other hand, if it is found that the  $MRP$  differs or if there are other costs that should be included in the  $MFC$ , then the differential may be merely a compensating wage differential. For instance, perhaps obese people have to spend more time away from the job, so that the  $MRP$  is different. Or perhaps the firm must provide special equipment or services for the obese, so that the  $MFC$  is higher. To know the answer, more information is required.





## CHAPTER 16

# Capital Markets



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**T**he three broad categories of resources are land, labor, and capital. Capital refers to the equipment, machinery, structures, and buildings necessary to produce goods and services. How do businesses acquire capital, and how much do they acquire? In this chapter, we examine the decision to acquire capital and the role that financial capital plays in this decision.



### FUNDAMENTAL QUESTIONS

- 1 What is the capital market?
- 2 What is the impact of technological change on the capital market?
- 3 What are stocks? How are stocks bought and sold?
- 4 What does a stock index represent?
- 5 What causes stock prices to rise and fall?
- 6 What causes bond prices to rise and fall?
- 7 What are bubbles and panics?





**1** What is the capital market?

# 1. The Capital Market

A firm will hire another worker when the marginal revenue product of that additional worker exceeds the marginal factor cost of the worker. In exactly the same way, a firm will decide to rent more building space or more equipment if the marginal revenue product of the additional capital exceeds its marginal factor cost. If a firm is going to own the building or the equipment, it is planning on using that capital for a few years and thus can think of it as renting it to itself. It is just like the case when people purchase a house; they are using the house for a few years instead of renting, so it is as if they were renting to themselves.

## 1.a. The Demand for Capital

The demand for capital is shown in Figure 1(a) as a downward-sloping curve with the quantity of capital measured on the horizontal axis and the price of capital measured on the vertical axis. Just as the price of labor is a rental price, the price of capital is also a rental price. An increase in the price of capital, say from \$80,000 to \$100,000 per machine in Figure 1(a), decreases the quantity of capital demanded, from 350,000 to 300,000 machines. For instance, a farmer will postpone getting a new tractor if the price increases, or an airline will postpone purchasing a new airplane when the price of airplanes increases.

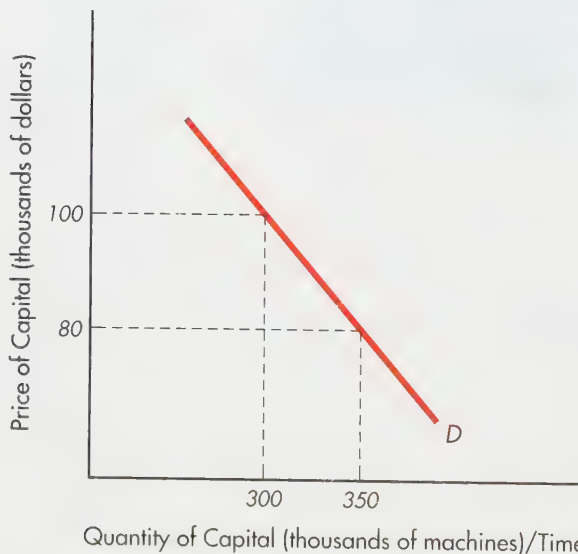
The demand curve for capital shifts when one of the nonprice determinants of demand changes. Perhaps the most important nonprice determinant of demand for capital is the interest rate. A firm has a choice of where to put its money. If it rents capital,



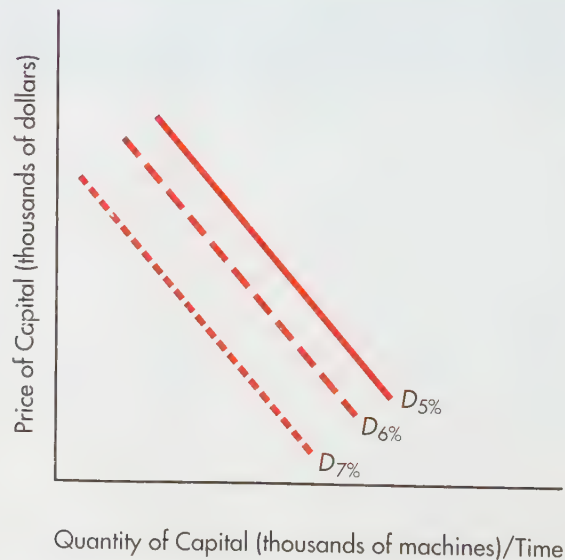
**2** What is the impact of technological change on the capital market?

**FIGURE 1** The Market Demand for Capital

**(a) Change in Quantity Demanded**



**(b) Change in Demand**



In Figure 1(a), the demand for capital is shown as a downward-sloping line, with the quantity of capital measured on the horizontal axis and the price of capital measured on the vertical axis. As the price of capital changes, say from \$80,000 to \$100,000 per unit of capital (per machine), the quantity of capital demanded changes, from 350,000 to 300,000 machines. In Figure 1(b), the relationship between the demand for capital and the interest rate is illustrated. As the rate of interest rises, the demand for capital declines—the demand curve shifts in. The interest rate associated with each demand curve is given as a subscript.

then it cannot deposit the money into an interest-earning account. So if the interest rate rises, the opportunity cost of renting capital rises, and less capital will be rented. Because this occurs at every rental price, the demand curve shifts when the interest rate changes. Each time the interest rate increases, from 5 to 6 to 7 percent, the demand curve for capital shifts in, as shown in Figure 1(b) by the move from  $D_{5\%}$  to  $D_{6\%}$  to  $D_{7\%}$ .

The demand curve also shifts when any other determinant of demand changes. For instance, technological change will affect the demand for capital. Technological change is an increase in the amount that resources are able to produce, everything else the same. For instance, each generation of computers is faster and more powerful than previous generation. Many firms need the latest and most advanced technology to be able to compete, so when technological change occurs rapidly, firms demand more capital.

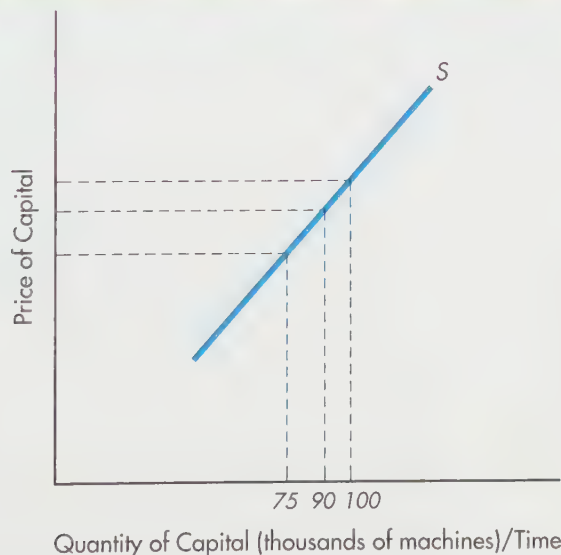
Expectations will also alter the demand for capital. A business that expects strong demand for its goods will want more capital, causing the demand curve for capital to shift out. Conversely, if a business expects increased regulations or taxes and reduced profits, it will not want more capital; in fact, it will want less capital, driving the demand curve for capital to shift in.

In sum, a change in the interest rate, a change in technology, a change in expectations, or a change in any other nonprice determinant of demand will change the demand for capital.

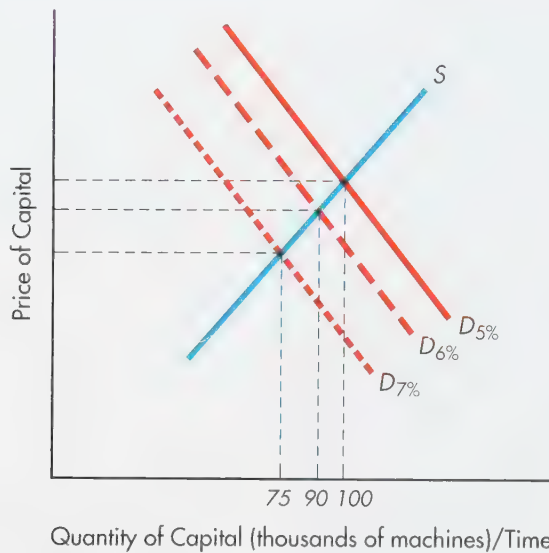
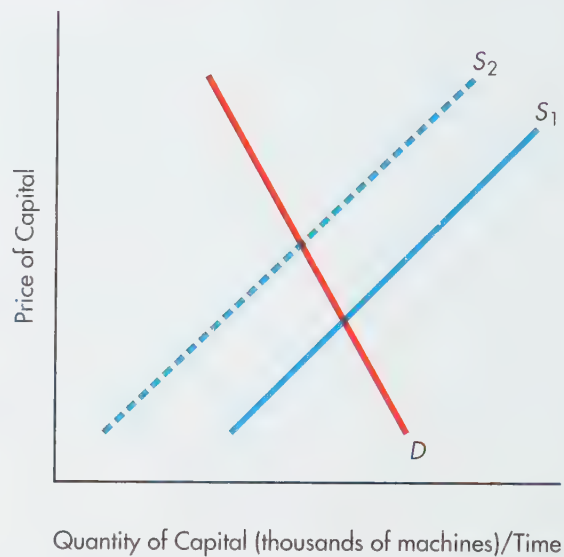
## 1.b. The Supply of Capital

The suppliers of capital are firms like John Deere, which supplies farm equipment; Boeing, which supplies airplanes; Dell, IBM, and Gateway, which supply computers; Intel and AMD, which supply computer chips; Lincoln Electric, which supplies arc welding equipment; and so on. The quantity of capital supplied by these firms depends on the price of the capital. As the price of capital rises, the quantity that producers are willing and able to offer rises, as shown in Figure 2 by the upward-sloping curve,  $S$ .

**FIGURE 2** The Interest Rate, the Price of Capital, and the Rate of Return on Capital



The supply of capital is an upward-sloping curve, indicating that the quantity of capital supplied rises as the price of capital rises, everything else the same. As the price of airplanes rises, the quantity of airplanes supplied by Boeing, Airbus, or the smaller firms rises.

**FIGURE 3** The Interest Rate, the Price of Capital, and the Rate of Return on Capital**(a) Interest Rate and Rate of Return****(b) Cost and Supply**

The demand for and the supply of capital determine both the price of capital and the quantity of capital produced and purchased. The rate of return on capital is the additional annual revenue generated by additional capital, divided by the purchase price of the capital. As shown in Figure 3(a), as the interest rate rises, the demand for capital declines (the demand curve shifts in), and the price of capital declines. As a result of the lower price, the rate of return rises. As shown in Figure 3(b), if the costs of supplying capital rise, everything else the same, the supply curve shifts in. This increases the price of capital and lowers the equilibrium quantity.

### 1.c. Equilibrium

The demand for and supply of capital determine the price of capital and the quantity supplied. Changes in demand or supply change the equilibrium price and quantity. For example, if the interest rate rises, the demand for capital decreases and the price of capital falls, as shown by the move from  $D_{5\%}$  to  $D_{6\%}$  to  $D_{7\%}$  in Figure 3(a). Similarly, if the costs of supplying capital rise, the equilibrium price and quantity are affected. As an example, suppose that a law is enacted requiring all farm equipment to have costly safety equipment. The costs to John Deere rise and the quantity of farm equipment supplied decreases, everything else held constant. The supply curve shifts in, as illustrated in Figure 3(b) by the move from  $S_1$  to  $S_2$ .

## RECAP

1. The capital market is the market in which physical capital is acquired.
2. The demand for capital is represented by a downward-sloping curve, illustrating that the quantity of capital demanded rises as the price of capital falls.
3. The demand for capital shifts when the interest rate rises, when technological change occurs, when expectations change, or in general when any non-price determinant of demand changes.
4. The supply of capital is represented by an upward-sloping curve, illustrating that the quantity of capital supplied rises as the rental price of capital rises.
5. The demand for and supply of capital determine the rental price of capital.



## 2. Equity

Stocks and bonds are called *financial capital* because they provide the funds with which capital can be purchased.



**3** What are stocks? How are stocks bought and sold?

### 2.a. Stocks

Whether you say shares, equity, or stock doesn't matter; these terms all mean the same thing—ownership of a piece of a company. Technically, owning a share of stock means that you own a share of everything the firm owns—every item of furniture, every piece of equipment, every building. In actuality, you are entitled only to a share of the company's earnings; you can't walk into the company's headquarters and walk out with a chair. There are two main types of stock: common and preferred stock. When people talk about stocks in general, they are referring to common stock. Preferred shares usually guarantee a fixed annual payment, or **dividend**. Common stock may or may not provide such a payment; that choice is at the discretion of the company.

#### **dividend**

The amount paid to shareholders on each share of stock owned.

#### 2.a.1. Stock Exchanges

Stocks are bought and sold on stock exchanges.

The New York Stock Exchange (NYSE), founded in 1792, is located on Wall Street in Manhattan and is the largest stock exchange in the world. Until 2006, trading on the NYSE could occur only on the trading floor. Beginning in 2006, customers have been able to choose between the floor-based auction market and sub-second electronic trading. The NASDAQ is a virtual market—for example, there is no central location and no floor brokers. Trading takes place only through computers. Buyers and sellers submit orders electronically, and there are no specialists like there are on the NYSE.

The third largest exchange in the United States is the American Stock Exchange (AMEX). Almost all the firms listed on the AMEX are small firms.

In addition to the various U.S. stock exchanges, many other countries have stock exchanges. In fact, trading is taking place somewhere in the world 24 hours a day.



Stock markets exist in all capitalist countries. They are the mechanism through which ownership in companies is bought and sold. Most stock market results are printed each day in newspapers, magazines, or online. Here we see the heading for the Hong Kong stock market called the Hang Seng Index.

# GLOBAL BUSINESS INSIGHT



## ADRs, or American Depositary Receipts

Suppose you want to purchase the stock of a foreign company, one that is listed on the London Stock Exchange. You need to convert your dollars to pounds and then get a broker to purchase that stock for you. When you have the broker sell the stock, you have to pay whatever taxes are required in the United Kingdom and then convert the pounds back to dollars. Or suppose you run a Scottish firm that needs a large sum of money in order to enter Asian markets. You know that the United States provides more funds to businesses than any other country, so you want to sell stock in the United States. To do so, you would have to go through the process of meeting all U.S. requirements and then finding an exchange on which you could list your company, translating your currency to dollars, and converting all your accounting statements to dollars. In addition to these difficulties, certain countries have regulations limiting foreign ownership (e.g., China, South Korea, Taiwan, and India) or controls on the movement of financial capital that make owning stock in a company in these nations difficult for U.S. investors. In the past, these transactions were very difficult, which meant that few U.S. investors owned stock in foreign companies and few foreign businesses raised money in the

United States. American Depositary Receipts (ADRs) allow easy access to non-U.S. stocks for U.S. investors.

An ADR is a stock that trades in the United States but represents a specified number of shares in a foreign corporation. ADRs are bought and sold on American markets just like regular stocks, and are issued or sponsored in the United States by a bank or brokerage. A U.S. bank purchases shares of a company, say Sainsbury's in England. The bank then issues ADRs representing ownership of the shares of Sainsbury's stock and sells them in the United States as a Sainsbury's ADR. Each ADR is backed by a specific number of the issuer's local shares; for instance, 1 Sainsbury's ADR = 1.5 Sainsbury's shares in the United Kingdom.

ADRs offer U.S. investors a convenient, easy-to-use avenue for owning international stocks. And for foreign companies, ADRs are an easy way to raise money from U.S. investors. Today, ADRs are used by approximately 2,200 non-U.S. issuers from more than 80 countries. Of the 2,200 ADRs, approximately 600 are listed on U.S. stock exchanges. The remainder are sold "over the counter." (A stock that is not traded on an exchange is said to trade over the counter.)

Figure 4 shows how trading begins each day and continuously moves west to London and then on to New York. Not only can you trade in different exchanges around the world, but trading for a stock listed on one exchange may occur "off hours." Although the NYSE might close at 4:00 p.m. Eastern Time, trading on some stocks may occur through computer-based exchanges throughout the night.

**2.a 2. How to Read a Stock Table/Quote** Most newspapers report stock prices. The reports look something like Figure 5 and include the columns listed here.

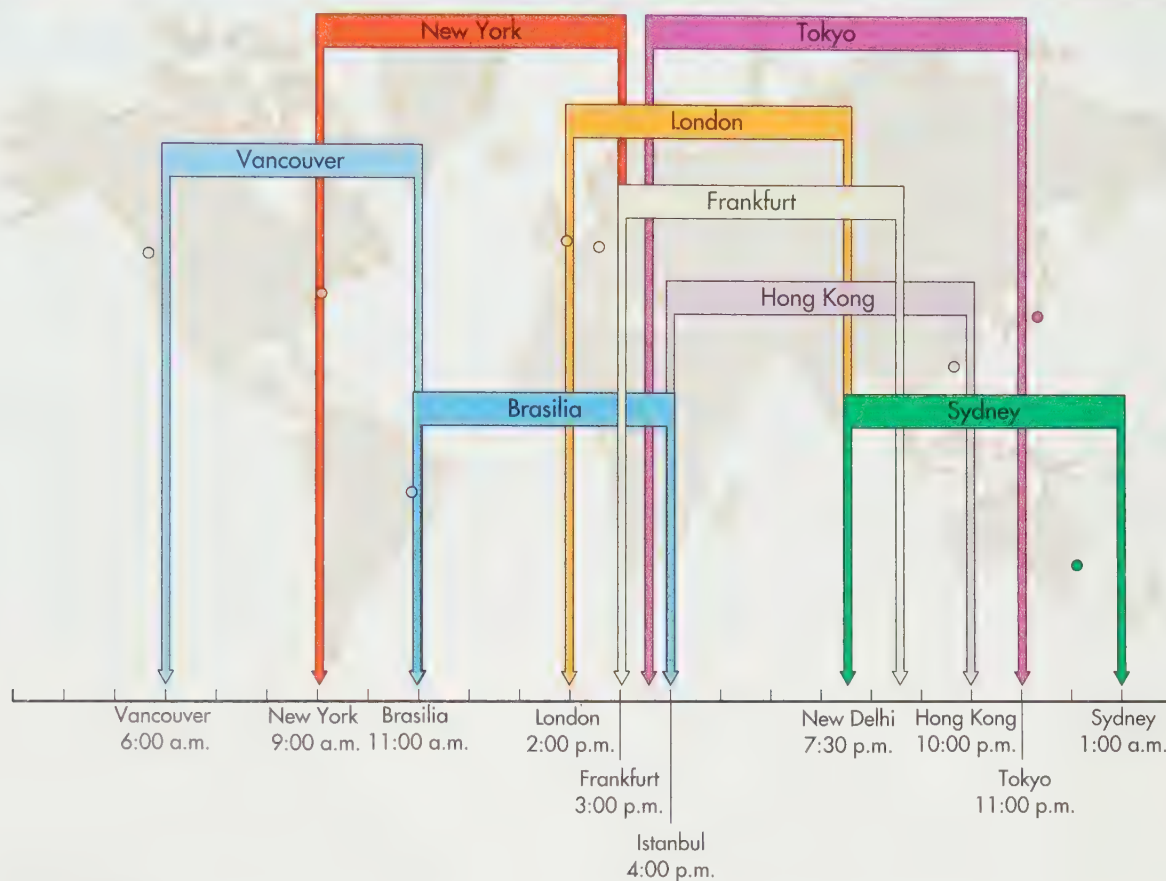
*Columns 1 and 2: 52-week high and low.* These are the highest and lowest prices at which the stock has traded over the previous 52 weeks (one year).

*Column 3: Company name and type of stock.* This column gives the name of the company. If there are no special symbols or letters following the name, the stock is common stock. Different symbols identify different classes of shares. For example, "pf" means that the shares are preferred stock.

*Column 4: Ticker symbol.* This is the unique alphabetic name that identifies the stock. If you are looking for stock quotes online, you use the ticker symbol.

*Column 5: Dividend per share.* This indicates the annual dividend payment per share. If this space is blank, the company does not currently pay dividends.



**FIGURE 4** Stock Exchanges Around the World

Stocks can be traded literally 24 hours a day. The day begins in one location and continues to move West. When Hong Kong is ready to shut down, London opens up, followed later by New York.

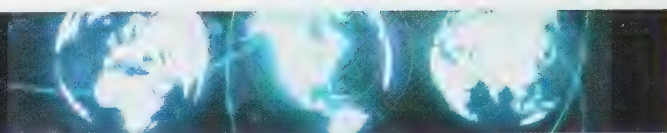
**FIGURE 5** Stock Market Listing

| 52W<br>high | 52W<br>low | Stock     | Ticker   | Yield    |          | P/E      | Vol<br>00s | High     | Low       | Close     | Net<br>chg |
|-------------|------------|-----------|----------|----------|----------|----------|------------|----------|-----------|-----------|------------|
|             |            |           |          | Div      | %        |          |            |          |           |           |            |
| 45.39       | 19.75      | ResMed    | RMD      |          |          | 52.5     | 3831       | 42.00    | 39.51     | 41.50     | -1.90      |
| 11.63       | 3.55       | RevlonA   | REV      |          |          |          | 162        | 6.09     | 5.90      | 6.09      | +0.12      |
| 77.25       | 55.13      | RioTinto  | RTP      | 2.30     | 3.2      |          | 168        | 72.75    | 71.84     | 72.74     | +0.03      |
| 31.31       | 16.63      | RitchieBr | RBA      |          |          | 20.9     | 15         | 24.49    | 24.29     | 24.49     | -0.01      |
| 8.44        | 1.75       | RiteAid   | RAD      |          |          |          | 31028      | 4.50     | 4.20      | 4.31      | +0.21      |
| 38.63       | 18.81      | RobtHalf  | RHI      |          |          | 26.5     | 6517       | 27.15    | 26.50     | 26.50     | +0.14      |
| 51.25       | 27.69      | Rockwell  | ROK      | 1.02     | 2.1      | 14.5     | 6412       | 47.99    | 47.08     | 47.54     | +0.24      |
| Column 1    | Column 2   | Column 3  | Column 4 | Column 5 | Column 6 | Column 7 | Column 8   | Column 9 | Column 10 | Column 11 | Column 12  |

Stocks are listed in newspapers in a standard form, showing annual highs and lows, dividends, P/E ratios, and daily volume and activity.



## ECONOMIC INSIGHT



### The P/E Ratio

How does a potential buyer decide which stocks to purchase? How does the buyer know when is a good time to buy? One method used is to see whether the stock price is appropriately related to the firm's earnings. The P/E ratio is an indicator of this relationship. The P/E ratio is the ratio of a company's share price (P) to its earnings per share (E). To calculate the P/E, you divide a company's current stock price by its earnings per share (EPS). Most of the time the P/E is calculated using the EPS from the last four quarters (known as the trailing P/E). Occasionally, however, you will see earnings expected over the next four quarters (known as the leading P/E) used as EPS.

Theoretically, a stock's P/E tells us how much investors are willing to pay for each dollar of earnings. For this reason, the P/E is also called the *multiple* of a stock. In other

words, a P/E ratio of 20 suggests that investors in the stock are willing to pay \$20 for every \$1 of earnings that the company generates during the period. If a company has a P/E higher than the market or industry average, this is interpreted as meaning that the market is expecting that the company will have better performance than the average firm in the market or industry over the next few months or years. But you can't just compare the P/Es of two different companies to determine which is a better value because the companies may have very different growth rates. If two companies both have a P/E of 20, but one is growing twice as fast as the other, then the faster-growing firm is undervalued relative to the slower-growing one. Finally, a low P/E ratio could mean that the market believes that the company is headed for trouble in the near future.

*Column 6: Dividend yield.* This gives the percentage return provided by the dividend. It is calculated as annual dividends per share divided by price per share.

*Column 7: Price/earnings ratio.* This is calculated by dividing the current stock price by the earnings per share for the last four quarters.

*Column 8: Trading volume.* This figure gives the total number of shares traded for the day, in hundreds. To get the actual number traded, add "00" to the end of the number given.

*Columns 9 and 10: High and low for the day.* This indicates the price range within which the stock has traded that day.

*Column 11: Close.* The close is the last trading price recorded when the market closed for the day. If the closing price is up or down more than 5 percent from the previous day's close, the entire listing for that stock is given in bold type.

*Column 12: Net change.* This is the dollar value change in the stock price from the previous day's closing price.

Stock quotes are also available on the Internet and are reported in the same way that the newspapers report them.



#### 4 What does a stock index represent?

#### market capitalization (market cap)

The stock price multiplied by the number of shares of stock that are outstanding.

**2.a.3. Stock Indexes** A stock index is a measure of the price movements of a group of stocks. The number of stocks in the group may vary; for example, there are 30 stocks in the Dow Jones Industrial Average (DJIA) and 6,500 in the Wilshire Index. Since the prices of individual stocks do not necessarily go up or down at the same time, the importance or weight of a single stock in an index will vary. Most indexes weight companies based on their **market capitalization (market cap)**, which is the stock price multiplied by the number of shares of that stock that are outstanding. If a company's market cap is \$1,000,000 and the value of all stocks in the index is \$100,000,000, then that company has a weight of 1 percent of the index. An exception to weighting stocks by market cap

is the DJIA, which uses the stock price relative to the sum of the prices of all the stocks in the index.

The most popular indexes are the DJIA, the Standard & Poor's 500 (S&P 500), the Wilshire 5000, and the Nasdaq Composite Index. The DJIA contains 30 companies, the S&P 500 includes 500 companies, the Nasdaq Composite includes all companies listed on the Nasdaq stock exchange, and the Wilshire 5000 contains more than 6,500 stocks (the 5000 in the name is misleading). The S&P 500 tries to represent all major areas of the U.S. economy. It does not use the 500 largest companies, but rather includes 500 companies that are widely owned and that represent all sectors of the economy. The stocks in the index are chosen by the S&P Index Committee, which typically makes between 25 and 50 changes every year. Non-U.S. companies were included in the past, but today, and in the future, only U.S. companies are included. The Nasdaq Composite Index includes all the stocks that are traded on the NASDAQ stock market. Most are technology- and Internet-related, although there are financial, consumer, biotech, and industrial companies as well. The Wilshire 5000 Index contains more than 6,500 stocks that trade in the United States. It includes all of the stocks on the New York Stock Exchange and most of the NASDAQ and AMEX issues. Another index, the Russell 2000, measures the performance of smaller stocks (small-cap stocks), which are often excluded from the big indexes. The average market capitalization in the Russell 2000 is approximately \$530 million. To put that into perspective, Walmart alone had a market capitalization of over \$225 billion in 2006.

These well-known indexes are only a few among many indexes; every major country has an index that represents its stock exchange.

## 2.b. Mutual Funds

More than 80 million people, or half of the households in the United States, invest in mutual funds. A **mutual fund** is a group of stocks or bonds of individual firms that are placed into a single investment pool by an investment company. For instance, one of the larger mutual fund investment companies is the Vanguard Group, which has many different mutual funds. One of its mutual funds is focused on high-tech firms, another on manufacturing firms, another on international firms, and so on. Individual investors are thus able to purchase a large set of stocks by simply purchasing shares in a mutual fund. There are more than 10,000 mutual funds offered to investors in the United States.

There are three general types of mutual funds: equity funds (made up of stocks), fixed-income funds (composed of corporate and government bonds), and money market funds (made up mostly of short-term U.S. government securities, but also including some corporate bonds).

If a fund includes international investments, it is called a **global fund** or an international fund. Some mutual funds focus on a specific sector of the economy, such as financial, technology, or health care stocks, whereas others focus on a specific area of the world, such as Latin America, or an individual country, such as Mexico. These are called **specific funds**. **Socially responsible funds** invest only in companies that meet certain criteria. Most socially responsible funds don't invest in companies producing such things as tobacco, alcoholic beverages, weapons, or nuclear power. An **index fund** attempts to mimic the performance of a broad market index, such as the S&P 500 or the Dow Jones Industrial Average. These mutual funds purchase shares of stock in those companies that are included in the index and weight them so as to create as close a copy of the index as possible.

Funds may be load or no-load. **Load** refers to fees paid to a fund manager. With a **front-end load**, you pay a fee when you purchase the fund. If you invest \$1,000 in a mutual fund with a 5 percent front-end load, \$50 will be used to pay for the sales

### **mutual fund**

An investment tool that aggregates many different individual stocks or bonds into one entity.

### **global fund**

A mutual fund that includes international investments.

### **specific fund**

A mutual fund that focuses on a particular industry or a particular part of the world.

### **socially responsible fund**

A group of stocks or bonds of companies that meet specified requirements for ethical behavior or environmental behavior.

### **index fund**

A mutual fund that tries to match the performance of a broad market index.

### **load**

The fees paid to the manager of a mutual fund.

### **front-end load**

A fee that you pay when you purchase a mutual fund.

**back-end load**

A fee that you pay if you sell a mutual fund within a certain time frame.

**no-load fund**

A mutual fund that sells its shares without a commission or sales charge.

charge, and \$950 will be invested in the fund. With a **back-end load**, you pay a fee if you sell the fund within a certain time frame. For example, a fund may have a 5 percent back-end load that decreases to 0 percent in the sixth year. The load is 5 percent if you sell in the first year, 4 percent if you sell in the second year, and so on. If you don't sell the mutual fund until the sixth year, you don't have to pay the back-end load at all. A **no-load fund** sells its shares without a commission or sales charge (fees are typically paid by clients on a prearranged basis).

**2.b.1. How to Read a Mutual Fund Table** A typical newspaper report on mutual funds looks like Figure 6. The columns in the mutual fund table provide the following information:

*Columns 1 and 2: 52-week high and low.* These columns show the highest and lowest asset values that the mutual fund has experienced over the previous 52 weeks (one year). They typically do not include the previous day's price.

*Column 3: Fund name.* This column gives the name of the mutual fund. The name of the company that manages the fund is written above the funds that the company manages in bold type.

*Column 4: Fund specifics.* Different letters and symbols have various meanings. For example, N means no load, FR means front-end load, and B means that the fund has both front-and back-end fees. X refers to an index fund.

*Column 5: Dollar change.* This states the dollar change in the asset value of the mutual fund from the close of the previous day's trading. NAVPS stands for net asset value per share, the value of the mutual fund divided by the number of shares of the fund.

*Column 6: Percentage change.* This states the percentage change in the asset value of the mutual fund from the close of the previous day's trading.

**FIGURE 6** The Reporting of Mutual Funds

| 52W<br>high                         | 52W<br>low | Fund            | Spec.    | Fri. NAVPS<br>\$chg %chg | high     | low      | Wkly NAVPS<br>cls \$chg %chg | high     | low       | cls \$chg %chg |
|-------------------------------------|------------|-----------------|----------|--------------------------|----------|----------|------------------------------|----------|-----------|----------------|
| <b>Montrusco Bolton Funds</b>       |            |                 |          |                          |          |          |                              |          |           |                |
| 11.71                               | 10.12      | Bal Plus        | *N       | -0.08 -0.76              | 10.58    | 10.50    | 10.50                        | 0.02     | 0.15      |                |
| 12.50                               | 10.25      | Growth Plus     | *N       | -0.10 -0.96              | 10.89    | 10.78    | 10.78                        | 0.02     | 0.22      |                |
| 31.39                               | 24.78      | Quebec Growth   | *FR      | 0.05 0.17                | 26.97    | 26.75    | 26.97                        | 0.43     | 1.61      |                |
| 13.78                               | 7.24       | RSP Intl Growth | *N       | -0.08 -1.01              | 7.45     | 7.36     | 7.36                         | -0.03    | -0.41     |                |
| 11.16                               | 9.09       | Value Plus      | *N       | -0.07 -0.75              | 9.39     | 9.32     | 9.32                         | 0.01     | 0.14      |                |
| 9.65                                | 8.90       | World Inc       | *N       | -0.04 -0.40              | 9.52     | 9.39     | 9.48                         | 0.04     | 0.43      |                |
| <b>Montrusco Select Funds CS(a)</b> |            |                 |          |                          |          |          |                              |          |           |                |
| 12.87                               | 10.49      | Balanced        | *N       | -0.04 -0.37              | 10.85    | 10.80    | 10.81                        | 0.05     | 0.45      |                |
| 16.32                               | 12.11      | Balanced+       | *N       | -0.05 -0.43              | 12.57    | 12.52    | 12.52                        | 0.06     | 0.45      |                |
| 10.36                               | 9.86       | Bond Index+     | X*N      | -0.03 -0.32              | 10.35    | 10.30    | 10.30                        | 0.04     | 0.37      |                |
| Column 1                            | Column 2   | Column 3        | Column 4 | Column 5                 | Column 6 | Column 7 | Column 8                     | Column 9 | Column 10 | Column 11      |

Financial newspapers report on mutual fund performance in a standard manner, showing annual and weekly activity.



*Column 7: Week high.* This is the highest asset value at which the fund was sold during the past week.

*Column 8: Week low.* This is the lowest asset value at which the fund was sold during the past week.

*Column 9: Close.* The asset value of the fund at the end of the trading day is shown in this column.

*Column 10: Week's dollar change.* This represents the dollar change in the asset value of the mutual fund from the previous week.

*Column 11: Week's percentage change.* This shows the percentage change in the asset value of the mutual fund from the previous week.

## RECAP

1. Shares, equity, and stock mean the same thing—ownership of a piece of a company.
2. There are two main types of stock: common and preferred stock.
3. A stock index is a measure of the price movements of a group of stocks.
4. A mutual fund is an entity that invests money in stocks, bonds, and other securities for groups of people.

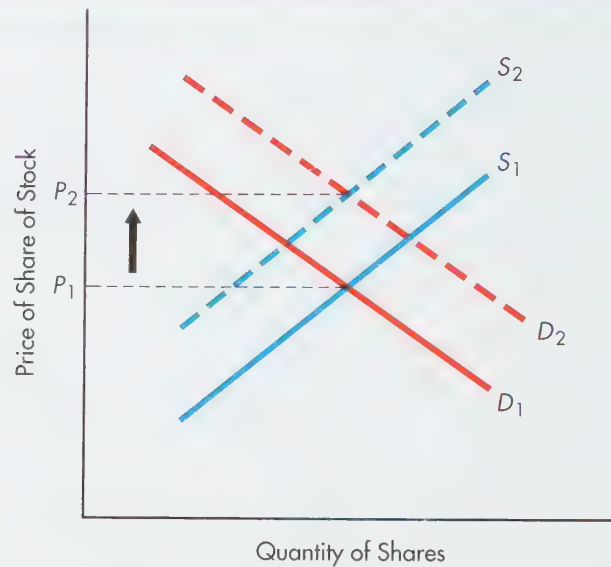
## 3. The Stock Market

The prices of stocks vary from day to day, and even from minute to minute. What causes stock prices to rise or fall? The answer is the same things that affect prices in any other market—demand and supply. The demand for stocks comes from investors—individuals, mutual funds, and other institutions like insurance companies—who are looking for the highest return on their funds. The return to a shareholder is the dividend the stock pays and the appreciation in the price of the stock. Suppose, for instance, that you purchased Microsoft at \$5 per share in 1996 and then sold it for \$100 per share in 2006. Your appreciation would have been \$95 per share over the 10-year period. Since Microsoft paid no dividends during this period, your total return would have been that appreciation.

The demand curve for the shares of a company's stock slopes downward, since the higher the price of the stock, everything else the same, the lower the quantity of stock demanded. Nonprice determinants of demand are the prices of other companies' stocks and other possible investments, expectations regarding stock price movements, income, and tastes and preferences. When one of the nonprice determinants of demand for a firm's stock changes, the demand curve shifts. For instance, if people expect the price of the stock to increase, demand will increase, as shown in Figure 7.

The supply of a stock comes from current shareholders who want to sell their shares of stock and from firms issuing new shares.<sup>1</sup> The supply curve for a company's stock slopes upward, indicating that the higher the price, the greater the quantity offered for sale, everything else the same. The nonprice determinants of supply are the prices of related stocks and other investments and the expectations of shareholders. When one of

<sup>1</sup> The primary market refers to the market in which a firm issues stock for the very first time (an IPO, or the initial public offering of stocks by a firm) or issues additional stock. The secondary market is what we are typically referring to when we speak of the stock market. This is the market in which outstanding shares are bought and sold.

**FIGURE 7** The Equity Market

Demand for stocks comes from investors looking to acquire wealth; the quantity demanded of a stock rises when the price of the stock declines. Supply of stocks comes from investors wanting to obtain money. The quantity supplied rises as the price of the stock rises. Demand shifts when the determinants of demand change; supply shifts when the determinants of supply shift.

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the nonprice determinants of supply changes, the supply curve shifts. For instance, if current shareholders begin to believe that the future price of the stock will be higher than they had previously believed, then they will tend to hold on to their shares—that is, to offer less for sale—and the supply curve will shift to the left, as illustrated in Figure 7.

You can see in Figure 7 that the effect of expectations that the price of a stock will rise in the future is an increase in the price of the stock today from  $P_1$  to  $P_2$ . Buyers want to purchase more shares now, so demand increases from  $D_1$  to  $D_2$ , and sellers are offering less for sale, so supply decreases from  $S_1$  to  $S_2$ . The result is a higher price today,  $P_2$ .

For one investor to sell a share of a particular company's stock to another investor, the buyer has to expect that the purchase of this stock will return more than any other comparable purchase, and the seller has to expect that the purchase of other financial assets, goods, or services with the money obtained from the sale of this stock will generate more satisfaction than holding onto the shares of this stock. An important point here is that buyers and sellers are comparing all possible investments and seeking the one that they think will give them the best return. Buyers and sellers evaluate the firm's stock on the basis of a comparison with all other comparable investments. A **comparable investment** is an investment that has the same features, such as risk and ease of selling (called liquidity), as the one being considered.

#### comparable investment

A stock that has the same features, such as risk and liquidity, as the one that buyers and sellers are evaluating.



**5** What causes stock prices to rise and fall?

### 3.a. Risk

Risk and return are related—if you take more risk, you expect more return. What is risk? It is the possibility that some unexpected event will occur. Most people are risk averse, meaning that they will pay to have less risk. Suppose you are given the opportunity to win some money, and there are two ways of doing it. With choice A, you get \$1,000,

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and with choice B, you have a 50 percent chance of getting 0 and a 50 percent chance of getting \$2,000. Which do you prefer?

Choice A = \$1,000

Choice B =  $\$0 \times 50\% = \$0$  or  $\$2,000 \times 50\% = \$1,000$

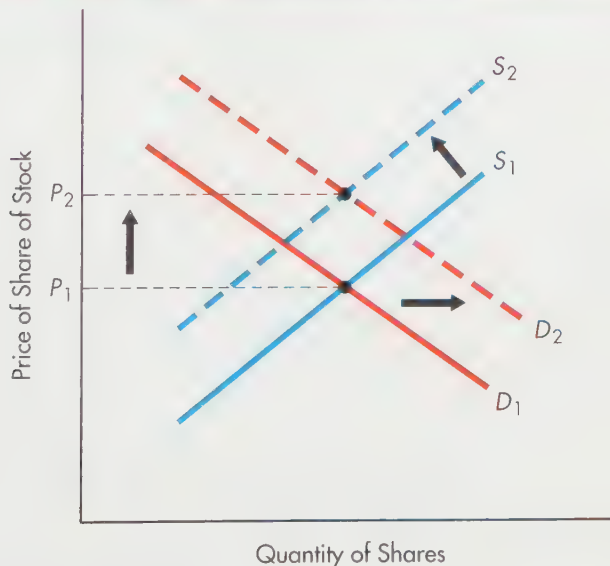
The average outcome of the choices is the same. Therefore, risk-averse people will choose A. To get risk-averse people to select B, we would have to offer them more, say  $\$100 \times 50\%$  or  $\$2,100 \times 50\% = \$1,100$ . This extra \$100 is called the risk premium—the amount that a risk-averse person requires in order to take on risk. A purchase of a firm's stock will include a risk premium, and the more risky the firm, the higher the premium. So if you have a choice of investing in Microsoft or a brand-new biotech company, you would need to have the possibility of earning a great deal more on the new company to get you to invest in it.

Rather than investing in the risky biotech firm or the less risky Microsoft, investors could decide not to take any risk at all. By not taking any risk, investors would expect to receive a return that is even lower than the return that an established firm like Microsoft would provide and much lower than the return that the high-risk firm would provide. Risk-averse people must be paid to take on more risk, and the more risk they take on, the more they must be paid.

### 3.b. Stock Price Changes

Stock prices change every day because of supply and demand. If more people want to buy a stock (demand) than want to sell it (supply), the price moves up. Conversely, if more people want to sell a stock than want to buy it, the price will fall. What causes demand and supply to change? When investors change their expectations so that they now expect the price of the stock to rise more than they previously did, more investors will want to buy. At the same time, fewer will want to sell. As illustrated in Figure 8,

**FIGURE 8** Revisions of Expectations



When a firm earns more than it had been expected to earn, investors in that firm's stock are likely to change their expectations of what the future may bring. This will induce investors to purchase more shares of the stock and sell fewer—an increase in demand and a decrease in supply.



when expectations are revised upward, demand will increase, supply will decrease, and price will rise from  $P_1$  to  $P_2$ . When expectations are revised downward, fewer investors will want to buy and more will want to sell. In this case, supply will increase (shift right), demand will decrease (shift down), and price will fall from  $P_2$  to  $P_1$ .

Firms are required to report their earnings (accounting profit) at the end of each quarter (for most companies, the end of March, June, September, and December). These quarterly reports are used by stock market analysts and investors to evaluate how well their previous forecasts of the firm's performance match what has actually been happening. When the quarterly results are not consistent with the investors' forecasts or expectations, the investors will revise their expectations of the firm's future performance up or down. If the earnings reports indicate lower earnings than had been expected, the forecasts will be revised downward, and the stock price will decline. When a firm does better than it had been expected to do, the forecasts will be revised upward, and the stock price will rise. As an illustration, consider the following report: "Google stock soared Friday, continuing Wall Street's love affair with the company, after its earnings easily topped estimates." The report states that investors realized that the revenues they had expected Google to earn were less than what Google actually earned, and so they began to think that the value of the company was higher than they had previously thought, and as a result they wanted to own more of it. The greater demand drove the price up.

### 3.c. Market Efficiency

There are hundreds of millions of people who own shares of stock. Some of these people analyze all available information about companies, and some don't even know which stocks they own. It would seem that those people who study the stock markets would be so much better informed than the average investor that they would be able to reap large returns relative to the average investor. But this is not necessarily so. To see why, suppose that a particular investor gains a reputation as a stock market guru—a very successful investor—and that the investor's activities are easily observed by others. What will happen? As with any market that does not have significant barriers to entry, when some firm (some person) begins making positive economic profits, others will mimic that firm (that person) and compete with it. As others copy the initial investor's strategy and mimic every move, the initial investor's returns drop—economic profit is driven down to zero. This view of the behavior of the stock markets suggests that no investor can continually outperform the market.

Another way in which this idea is expressed is by saying that one can do as well at picking stocks by throwing darts at the stock tables as by picking them in any other way.<sup>2</sup> If there was one best way to pick stocks, then everyone would focus on that method, and the price would reflect all such information. There would be no way to do better than everyone else. This is what people mean when they say that the market is *efficient*.

Prices are the result of demand and supply, and demand and supply take into account all relevant or important information. Stock prices reflect or incorporate all relevant information about a company, expectations concerning the company's performance and the economy's performance, and any other event that could affect the firm. The point is that stock prices will incorporate and reflect all relevant information once that information appears. Thus, even though investors possess widely differing amounts of information, there is no way in which one investor can continually make above-normal profits or "beat the market." Of course there are some investors who seem to do better than others, but in few cases does a single investor continually do better than others.

<sup>2</sup> This statement was made in a 1973 book by Burton Malkiel, *A Random Walk down Wall Street* (W. W. Norton and Company).

The basic idea of efficient markets is that there are no sure profits. Investing is a risky business, as prices continually adjust to new information and circumstances.

If the market is efficient, how can stock market bubbles and panics be explained? A bubble or panic is a sudden increase or decrease in prices that occurs simply because people are jumping on the bandwagon without an underlying economic basis. In the tech bubble of the 1990s, the price of Amazon.com stock was very high even though the company had never made a profit. Perhaps some of that stock price was based on expectations of future profits, but a great deal of it was the result of investors gambling or speculating on the basis of wishful thinking. In that period, people heard about “the secretary in a start-up company who became a millionaire,” and so they purchased stocks in start-up companies in order to become rich also. The problem is that wishful thinking by itself cannot drive stock prices up for very long. Eventually a firm must earn positive economic profits. The stock market collapsed in 2000 partly because it became evident that firms were not earning economic profits that were high enough to support the inflated stock prices. In the short run, psychological aspects may drive stock prices, but over the long run, stock prices will reflect profit.

## RECAP

1. The equity market is the market in which stocks are bought and sold.
2. The demand for equities comes from investors who are seeking the greatest return on their savings.
3. The supply of equities comes from stock owners who want to sell their stock and purchase something else.
4. Demand depends on expectations, income, and the prices of and returns on other investments. Supply depends on expectations and the prices of and returns on other investments. A change in one of these determinants of demand and/or supply will cause the curve to shift. If buyers want to buy more stock (demand) than sellers want to sell (supply), then the price will move up. Conversely, if sellers want to sell more of a stock than buyers want to buy, the price will fall.
5. The equity market is said to be an efficient market in the sense that it is difficult for an investor to continually earn above-normal profits. If there were a secret formula for becoming rich in the stock market, everyone would soon learn that formula, and it would no longer be an effective strategy.

## 4. Bonds

Firms can raise cash by selling ownership rights (shares of stock—equity—in the case of a public company), by retaining earnings in the firm (not distributing profits to owners in the form of dividends), and by selling bonds or taking out loans (debt). A **bond** (sometimes called a fixed-income security or debt security) is an IOU issued by a borrower to a lender. When you buy a newly issued bond, you are lending money to the borrower. When you purchase a bond that is not a new issue, you are buying that bond not from the issuing firm but from an investor or lender that initially provided the loan. You are choosing to own a portion of the debt obligation of a company because you think that the return on that bond exceeds the return on whatever else you might have done with the money used to purchase the bond. The seller of the bond has decided that he is better off selling that debt and thus receiving money now than waiting for the debtor (the issuing firm) to pay off the loan.

There is a specified time at which the borrower will repay your loan; this is the **maturity date**. In most cases, the bond’s **face** or **par value** is \$1,000; this is the amount that the lender will be repaid once the bond matures. The borrower pays the lender a

### **bond**

An IOU issued by a borrower to a lender.

### **maturity date**

The specified time at which the issuer of a bond will repay the loan.

### **face or par value**

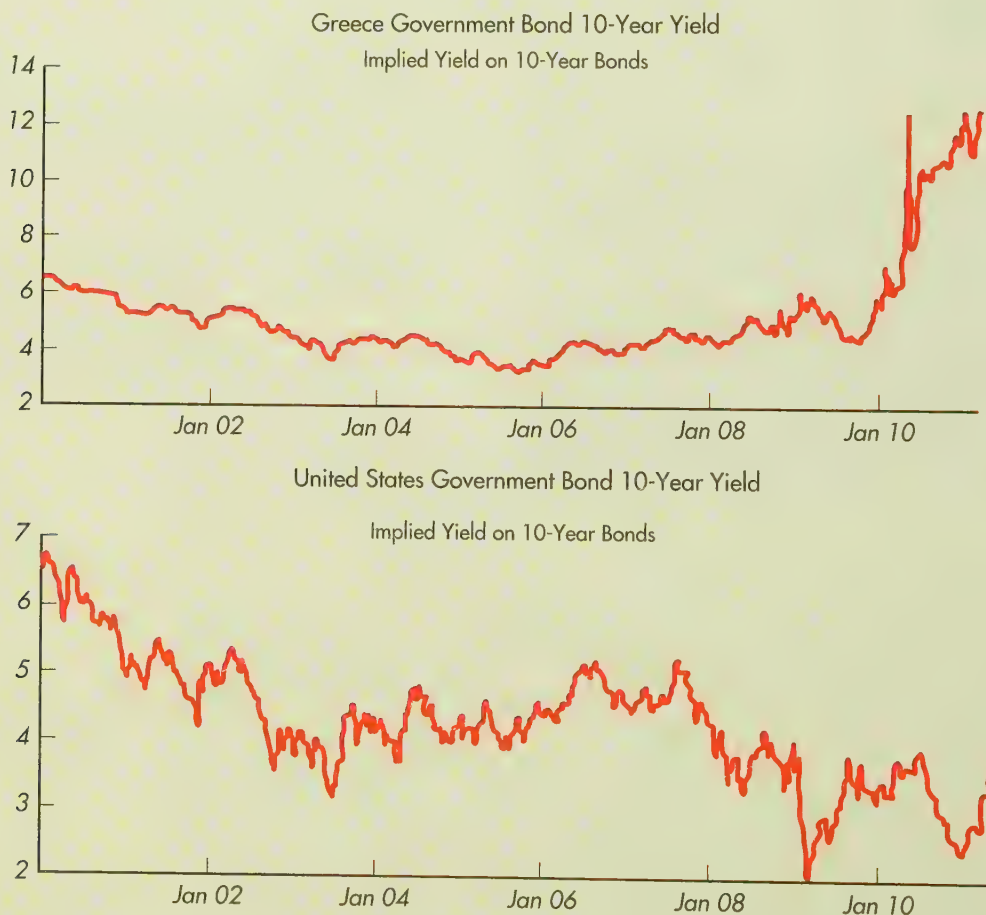
The amount that the lender will be repaid when a bond matures.

# GLOBAL BUSINESS INSIGHT

## Country Bond Ratings

Governments issue bonds in order to raise money, and government bonds are rated in terms of risk much like corporate bonds are. During the financial crisis of 2008–2010, many governments increased their debt so much that their bonds become very risky. Greece was the first to experience serious problems. On April 27, 2010, the Greek debt rating was decreased because of fears of default by the Greek government. When the risk is higher, then the borrowing entity must offer higher interest rates or yields on the debt

to entice lenders to lend. The following figure shows how fast the interest rate offered on Greek bonds rose; the rise was necessary to try to induce people to take the risk and purchase Greek bonds. Then just below the Greek picture is the United States. While the U.S. debt also has soared, it remains Aaa rated—low risk by Moody's and Fitch rating firms but was downgraded by S&P rating firm to AA+ in the summer of 2011.



Sources: TradingEconomics.com, Reuters, Bloomberg.



**FIGURE 9** Bond Ratings

| Bond Rating |                   | Grade      | Risk         |
|-------------|-------------------|------------|--------------|
| Moody's     | Standard & Poor's |            |              |
| Aaa         | AAA               | Investment | Lowest risk  |
| Aa          | AA                | Investment | Low risk     |
| A           | A                 | Investment | Low risk     |
| Baa         | BBB               | Investment | Medium risk  |
| Ba, B       | BB, B             | Junk       | High risk    |
| Caa/Ca/C    | CCC/CC/C          | Junk       | Highest risk |
| C           | D                 | Junk       | In default   |

Rating agencies provide measures of the amount of risk associated with particular bonds.

fixed amount, called a **coupon**, each year. These interest payments are usually made every six months until the bond matures. The rate of interest that must be paid—that is, the *coupon rate*—depends on how risky the borrower is. The chart in Figure 9 illustrates the different bond rating scales from the two major rating agencies, Moody's and Standard & Poor's, their associated grades, and the risk levels that the ratings indicate.

### coupon

The fixed amount that the issuer of a bond agrees to pay the bondholder each year.

## 4.a. Bond Ratings

U.S. government bonds are considered no-risk investments because it is so unlikely that the United States will default on its obligations. Corporations must offer a higher yield than the government in order to entice lenders to purchase corporate bonds because corporate bonds are more risky. AAA corporate bonds—often referred to as blue chip bonds—are the lowest-risk corporate bonds. The highest-risk corporate bonds are called junk bonds. Junk bonds are typically rated at BB/Ba or lower. On average, a bond carries less risk than a share of stock because in the event of the firm's collapse, the shareholders cannot get anything until all debtholders have been paid.

## 4.b. Reading a Bond Table

In every financial newspaper there are bond tables similar to the one shown in Figure 10. The columns in the bond table provide the following information:

**FIGURE 10** Reading a Bond Table

|                        | Coupon   | Mat. Date | Bid \$   | Yld%     |
|------------------------|----------|-----------|----------|----------|
| <b>Corporate</b>       |          |           |          |          |
| GTE Florida Inc        | 6.860    | Feb 01/28 | 102.562  | 6.635    |
| General Motors Corp    | 8.375    | Jul 15/33 | 76.000   | 11.205   |
| General Mtrs Acep Corp | 8.000    | Nov 01/31 | 98.358   | 8.152    |
| General Elec Co        | 5.000    | Feb 01/13 | 100.112  | 4.979    |
| Ford Mtr Co Del        | 7.450    | Jul 16/31 | 74.437   | 10.306   |
| Column 1               | Column 2 | Column 3  | Column 4 | Column 5 |

Bonds are reported in financial newspapers and on the Internet in a standard manner.

*Column 1: Issuer.* This is the company, state (or province), or country that issued the bond.

*Column 2: Coupon.* The coupon refers to the fixed interest rate that the issuer pays to the lender. The coupon rate varies by bond.

*Column 3: Maturity date.* This is the date when the borrower will pay the lenders (investors) their principal back. Typically only the last two digits of the year are quoted: 25 means 2025, 04 is 2004, and so on.

*Column 4: Bid price.* This is the price that someone is willing to pay for the bond. It is quoted in relation to 100, no matter what the par value is. Think of the bond price as a percentage: A bid of \$93 means that the bond is trading at 93 percent of its par value.

*Column 5: Yield.* The yield indicates the annual return until the bond matures. Yield is calculated as the amount of interest paid on a bond divided by the price; it is a measure of the income generated by a bond. If the bond is callable, the yield will be given as “c—,” where the “—” is the year in which the bond can be called. For example c10 means that the bond can be called as early as 2010.

### zero-coupon bond

A bond that provides no interest payments but is issued at a value lower than its face value.

You will hear some bonds referred to as bills or notes. The name indicates the length of time until the bond matures. *Bills* are debt securities maturing in less than one year. *Notes* are debt securities maturing in one to ten years. *Bonds* are debt securities maturing in more than ten years. A bond that provides no interest payments but instead is issued at a value that is lower than its face value is called a **zero-coupon bond**.



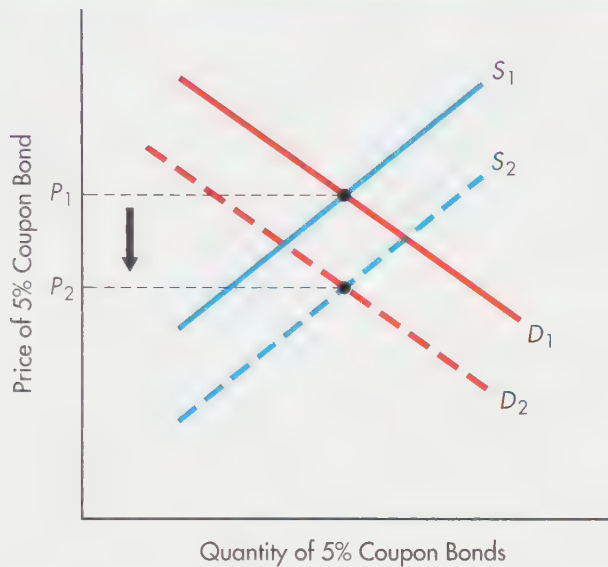
### 6 What causes bond prices to rise and fall?

## 4.c. The Bond Market

The market for bonds is not very different from the stock market, and the two are closely linked. Demanders of bonds are investors who are looking for the best return on their savings. They will purchase a bond when the return on the bond is expected to be greater than the return on other comparable investments—for instance, better than the return on stocks adjusted for risk. Consider a \$100 bond maturing in one year that pays a 5 percent rate of interest, or coupon rate. The bondholder receives \$5 per year in interest until the bond matures. If the price of the bond is \$100, the same as the face value, then the yield is 5 percent ( $\$5/\$100$ ). But if the price of the bond is lower than the face value, say \$95, the yield is  $\$10/\$95 = 10.52$  percent. Thus, for a bond paying a 5 percent coupon, as the price rises, everything else the same, the quantity demanded will decline, so the demand curve slopes down. The demand for bonds depends on the coupon, the prices of and interest rates on other bonds and other investments, expectations of investors, income, and other factors. When one of the determinants of demand other than the bond's own price changes, the demand curve shifts. For instance, in Figure 11, an increase in interest rates on other investments will cause the demand for a bond offering a 5 percent coupon to decline—the demand curve shifts down from  $D_1$  to  $D_2$ .

The suppliers of bonds are companies, governments, and other institutions offering new issues of IOUs and investors who own previously issued bonds and want to sell them. The supply curve slopes upward, illustrating the idea that as the price of an IOU rises, everything else the same, the quantity offered for sale rises. The supply depends on the prices of other bonds and investments, interest rates on other bonds and investments, and expectations of bond sellers. If interest rates on other investments rise, the quantity of bonds offering a 5 percent coupon that suppliers are willing and able to sell will rise—the supply curve shifts out, and the bond price falls.

As illustrated in Figure 11, the result of an increase in interest rates, everything else the same, is to cause the price on a 5 percent coupon bond to fall. This illustrates the fact that bond prices and interest rates are inversely related. Everything else the same, when interest rates rise, bond prices fall.

**FIGURE 11** The Bond Market

The demand for bonds comes from lenders—investors who want to earn interest on their savings. The supply of bonds comes from the holders of bonds—firms and governments that are attempting to borrow and bond owners that are offering to sell. The quantity demanded of a bond paying a fixed coupon declines as the price of the bond rises; the quantity supplied of a bond paying a fixed coupon rises as the price of the bond rises. Demand and supply together determine the price of the bond. If expectations, interest rates on other investments, or something else other than the price of the bond changes, the demand for the bond and/or the supply of the bond will change—the curves will shift.

Bonds and stocks are often substitute goods, meaning that as the price of stocks rise, the demand for bonds rises. The reason for this is that investors sell their shares of stock and purchase bonds when interest rates are higher than the expected return on stocks. Suppose that investors are expecting stock prices to decline in the future. Then current shareholders will offer to sell more stock. The supply of shares of stock increases and demand drops, forcing stock prices down. Expecting stock prices to drop, investors purchase bonds and other assets, driving the price of bonds up. As the price of bonds rises, the interest rate declines (remember the inverse relationship between interest rate and bond price).

In some cases, bonds and stocks are complementary goods. An investor will purchase both stocks and bonds when both are expected to yield better returns than other investments and when the investor wants to diversify his or her portfolio—to not put all of his or her eggs in one basket. Thus, we can't always say that when stock prices rise, bond prices will fall, and vice versa. In some circumstances, bond and stock prices will rise and fall together.

## RECAP

1. Bonds are IOUs provided by the lender or issuer of the bond to the purchaser of the bond.
2. The demanders of bonds are individuals and mutual funds seeking the highest return given a certain amount of risk.
3. The suppliers of bonds are the original issuers or borrowers—corporations and governments—and bond owners who choose to sell bonds that they own.
4. The market for a bond consists of the demand for and supply of that bond. The price of the bond is determined by demand and supply.





## 7 What are bubbles and panics?

### bubble

A situation in which the price of an asset is being bid up through speculation or gambling rather than because of the value of the services the asset returns.

## 5. Asset Prices and Bubbles

The term **bubble** means that the price of an asset is being bid up through gambling rather than because of the value of the services the asset returns. In other words, the price of an asset is *not* based on its fundamentals. Economists value an asset as the discounted sum of the revenues it will yield. When the price of a stock rises significantly higher than can be justified by the dividends the firm can be expected to pay in the future, a stock bubble is said to have occurred. The frenetic rise in stock prices that occurred from 1995 until 2000 is called the dot-com bubble. The same applies to any asset—when the price of the asset rises significantly above the value of the services the asset provides, a bubble occurs.

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### 5.a. Bubbles and Panics

What defines a bubble or panic? It starts as a development with far-reaching, perhaps unknowable, implications, such as the collapse of mortgage-backed securities or a government grant of a monopoly. People leverage or buy on margins—borrowing for most of their purchase. The buying drives prices up further and induces even more buying. Eventually, some event triggers a downturn. Margin buyers (optimists) get squeezed and are forced to pay their debts. Pessimism takes over and the decline in prices leads to mass selling. Eventually, pessimism runs its course, prices turn up, and people step in to buy.

Do bubbles in asset prices exist? That is, is it possible for the prices of stocks and other assets to rise well above the values justified by economic fundamentals? Those who experienced the rise in stock prices in the late 1990s, the rise in housing prices in the 2000s, and the great boom and bust in Tokyo commercial real estate in the 1980s will no doubt wonder how anyone could ask the question. Yet many financial economists are skeptical that bubbles are possible. They ask: Why would people knowingly pay a price for an asset that is out of line with any reasonable estimate of its value in the near future?

Some of the more famous bubbles and panics are listed in Table 1. The three most famous are the Tulipomania, the Mississippi Company, and the South Sea Company bubbles. According to one study, in all three cases, the prices of the assets—whether bulbs or shares—were apparently based on economic fundamentals.<sup>3</sup> Since economists value an asset as the discounted sum of the revenues the asset will yield, the future value of a tulip bulb could justify high prices. For instance, bulbs that yield tulips with beautiful patterns can themselves be propagated, so they yield many more bulbs. Hence, high prices for the original rare bulbs that fall as the supply rises should be no more surprising than high prices for corn.

So what differentiates a bubble and a price rise based on fundamentals? You have to know when the price of an asset is not linked to the fundamentals. If you can know that only with hindsight, then the original price increase does not constitute a classic bubble.<sup>4</sup>

### 5.b. Housing Bubble

Between 2001 and 2006, house prices in the United States rose more than 45 percent after adjusting for inflation. People want housing for the services it provides—a roof over their heads, among others—and people can obtain these services either by renting or by purchasing. The choice most people face is whether to purchase a house and give up part

<sup>3</sup> *Famous First Bubbles*, Peter M. Garber, MIT Press, 2001.

<sup>4</sup> Discussion of *Famous First Bubbles* at [http://www.davidrhenderson.com/articles/0900\\_famousfirst-bubbles.html](http://www.davidrhenderson.com/articles/0900_famousfirst-bubbles.html); <http://people.few.eur.nl/smart/m-economics/bubbles.htm>.

**TABLE 1** Famous Bubbles and Panics**Tulipomania, Holland, 1636–1637**

Prices of tulip bulbs rose twelve-fold from January 1, 1637, to a peak on February 3, 1637, of 1,500 guilders a pound (about four years' income for a master carpenter). Later in February 1637, prices fell by about 90 percent.

**Mississippi Company Bubble, France, 1717–1720**

In August 1717, the *Compagnie des Indes* (commonly known as the Mississippi Company) was incorporated. The French regent gave it a monopoly on trading rights with French colonies, including what was then known as French Louisiana. In August 1719, a scheme was devised by consultant John Law in which the Mississippi Company subsumed the entire French national debt, and launched a plan whereby portions of the debt would be exchanged for shares in the company. The bubble burst in May 1720 when a run on the *Banque Royale* forced the government to acknowledge that the amount of metallic currency in the country was not quite equal to half the total amount of paper currency in circulation.

**South Sea Company Bubble, England, 1720–1721**

Shares of stock in South Sea Company rose dramatically: At one point the company was more highly valued than the entire island of England. During the same period that French speculators were driving up the price of shares in the Mississippi Company, English speculators were purchasing stock in the South Sea Company. Formed in 1711 by Robert Harley, the South Sea Company was created to convert £10 million of government war debt (incurred during the War of Spanish Succession) into its own shares. In 1720, following John Law's example in France, the company proposed to take over the entire British national debt. As soon as the plan was announced to Parliament, the company's share prices began to rise as speculators gambled on the conversion plan.

**Stock Market Crash, United States, 1920s–1930s**

The driving factor behind both the inflation (during the 1920s) and the burst (in 1929) of the stock market bubble was the expanding use of leverage (i.e., debt) by individuals as well as corporations. On October 24, 1929, Black Thursday, stock prices plummeted, and a record 12,894,650 shares were traded on the New York Stock Exchange. Five days later, on October 29, 1929 (Black Tuesday), 16,410,030 shares were traded on the New York Stock Exchange, and prices collapsed from a peak reached in August 1929.

**The Bubble Economy, Japan, 1984–1989**

The stock market bubble was fueled by a Japanese corporate invention, known as “zaitech,” or “financial engineering,” by which speculation became an integral part of corporate earnings statements. After obtaining low-interest loans, corporations were easily able to raise funds on the markets.

**Dot-Com Bubble, United States, 1995–2001**

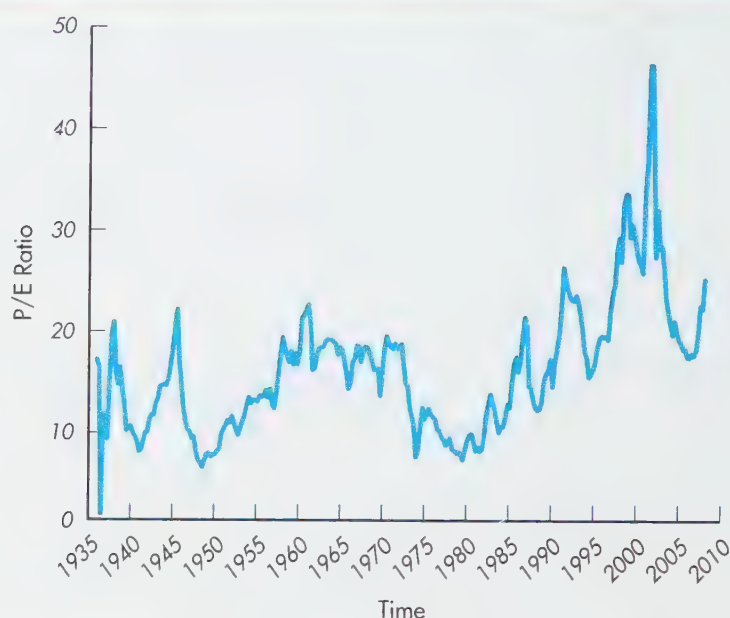
Stock prices rose rapidly, driving price-to-earnings ratios in high-tech companies far above normal ranges. In March 2000, the stock market crashed. The collapse of the dot-com bubble wiped out \$5 trillion in market value of technology companies from March 2000 to October 2002.

of their disposable personal income (DPI) in order to purchase it, or to rent a house and use the DPI that is not used on the house to purchase stocks or other assets. People will purchase housing when it is relatively less costly than renting.

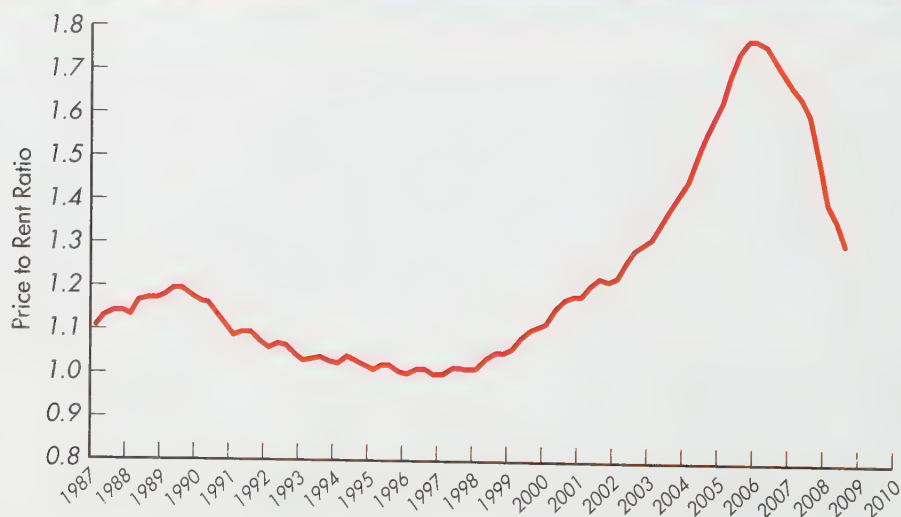
When people purchase an asset, any asset, they expect that asset to provide benefits or payments in the future. For a stock, the payoff is the future earnings of the firm. People buy a stock thinking they will be paid each year through dividends or appreciation, so the price they are willing to pay depends on how long they think it will take for the firm to pay them back. The P/E ratio gives an indication of this.<sup>5</sup> If you pay \$40 for a share of stock, and the earnings per share is \$2, then the P/E ratio is 20/1, which tells us that if the performance of the firm stays the same, it will take 20 years for the firm's earnings to add up to the purchase price. If the P/E ratio rises to 40, then you are essentially waiting 40 years for the return. During the stock market bubble, P/E ratios hit levels of 80 for many companies and even higher for start-up high-tech companies. This is illustrated in Figure 12.

If you think about a house in the same way as other assets, then you want to find how long it will take for the value of the housing services you receive each year to add up to the price of the house; this should be about the same as adding up all rents to be paid in the future. A ratio of the prices of houses to the rents on houses (P/R) between 1980 and 2009 is shown in Figure 13. The figure suggests that in 2004, prices were

<sup>5</sup> The P/E ratio is price per share divided by earnings per share of a given stock.

**FIGURE 12** A Plot of the S&P 500 Composite Index Price to Earnings (P/E) Ratio

Source: <http://www2.standardandpoors.com>.

**FIGURE 13** The Price-Rent (P/R) Ratio, Q1 1997 = 1.0. National Case-Shiller Home Price Index and Owner Equivalent Rent

The annual value of housing services should be approximately equal to the discounted cost of rents. In this diagram the house price index created by economists Case and Shiller is divided by the rental price. The two are equal to 1 in 1997, but rise to nearly 1.8 in 2006. This means that housing prices were significantly greater than the rental value of the house.

Source: Used by kind permission of Bill McBride, who shared this information through his blog, "Calculated Risk." <http://calculatedrisk.blogspot.com>.



high relative to rents. Could you say that this indicates a housing bubble? In fact, it was; the bubble burst in 2006. House prices fell from 2006 to 2009 by around 30 percent.

Several factors are necessary for an asset's value to rise in such a way that it looks like a bubble. First, demand must rise relative to supply. In order for demand to rise, it must be financed by increased liquidity—that is, buyers must be willing and able to purchase more. In both the dot-com boom and the housing bubble, the liquidity was provided by the Federal Reserve as it kept interest rates low by increasing the rate of growth of the money supply. Adding to the demand were the actions of government in increasing the amount of lending provided to what are called subprime or low-quality borrowers.

The second part of an apparent bubble is that the demand rises due to the expectation that prices will continue rising. Many house purchases were made by investors hoping to resell the house in the future at higher prices. So the expectations of gains induced an increase in demand. When the Federal Reserve began raising interest rates, the housing market slowed and eventually crashed. Was it a bubble or did housing prices reflect fundamentals?

## RECAP

1. A bubble refers to a situation where an asset price is being bid up not by the fundamental value of that asset, but by gambling.
2. The fundamentals refer to the value of services an asset provides over its life or the discounted value of the sum of revenues the asset will provide.
3. The housing bubble of 2002–2006 is called a bubble because, in hindsight, it is clear that the price of housing far exceeded the discounted value of rents the houses would have provided.

## SUMMARY

### 1. What is the capital market?

- Capital includes the machines, equipment, structures, and buildings that firms use to produce goods and services. *Preview*
- The demand for capital comes from firms that want to use capital in order to supply goods and services. The supply of capital comes from firms that provide the machines or buildings to other firms. §1.a, 1.b
- The demand for and supply of capital determine the rental price of capital and the quantities supplied and demanded. Nonprice determinants of demand include interest rates—the higher the interest rate, everything else the same, the lower is the quantity demanded. §1.a, 1.c

### 2. What is the impact of technological change on the capital market?

- Technological change refers to improvements that allow more output to be produced for each unit of input. §1.a

- Firms demand more capital when technological change occurs. Thus, technological change is a nonprice determinant of demand. §1.a

### 3. What are stocks? How are stocks bought and sold?

- The supply of funds with which firms acquire capital comes from selling stocks and bonds and taking out loans from financial institutions. §1.b, 1.c
- Shares, equity, and stock mean the same thing—ownership of a piece of a company. §2.a
- There are two main types of stocks: common stock and preferred stock. §2.a
- Stocks are bought and sold on stock exchanges. A company will complete specified requirements and pay fees to have its stock listed on a particular exchange. Typically, the NYSE lists larger, well-known companies; NASDAQ lists high-tech and biotech companies; and the AMEX lists small-cap stocks. Non-U.S. companies are listed

on stock exchanges in their own countries. §2.a.1

#### 4. What does a stock index represent?

- A stock index is a measure of the price movements of a group of stocks. The best-known indexes are the Dow Jones Industrial Average, the S&P 500, the NASDAQ Composite, and the Wilshire 5000, but there are other indexes for U.S. companies and indexes for every stock exchange in the world. §2.a.3
- A mutual fund is an investment tool that aggregates many different individual stocks or bonds into a single investment pool. §2.b

#### 5. What causes stock prices to rise and fall?

- The equity market is the market in which stocks are bought and sold. §3
- The demand for equities comes from investors who are seeking the greatest return on their savings—individuals, mutual funds, and institutions like insurance companies. §3
- The supply of equities comes from stock owners who want to sell their stock and purchase something else. This is known as the secondary market. The primary market is the market for new issues—stocks that have not previously been sold by the firms. It is the secondary market that people are referring to when they speak of the stock market. §3
- Demand depends on expectations, income, and prices of and returns on other investments. Supply depends on expectations and on prices of and returns on other investments. A change in one of these determinants of demand and/or supply will cause demand and/or supply to change. §3.b
- If buyers want to buy more of a stock (demand) than sellers want to sell (supply), then the price will move up. Conversely, if sellers want to sell more of a stock than buyers want to buy, the price will fall. §3.b
- The equity market is said to be an efficient market in the sense that it is difficult for an investor to continually earn above-normal profits. If there were a secret formula for becoming rich in the stock market, everyone would soon learn that

formula, and it would no longer be an effective strategy. §3.c

- Bubbles and panics occur because people are simply jumping on the bandwagon without an underlying economic basis. Although these tendencies can affect the prices of stocks in the short run, it is the performance of the firm that determines the stock price in the long run. §3.c

#### 6. What causes bond prices to rise and fall?

- Bonds are IOUs provided by a lender or issuer of the bond to the purchaser of the bond. §4
- The demanders of bonds are individuals and mutual funds that are seeking the highest return given a certain amount of risk. §4.c
- The suppliers of bonds are corporations and governments attempting to borrow money and the owners of previously issued bonds who choose to sell their bonds. §4.c
- The market for a bond consists of the demand for and supply of that bond. As with the stock market, demand depends on the prices of and expected returns on other investments, income, and investor expectations; supply depends on the prices of and expected returns on other investments and supplier (bond issuer) expectations. §4.c
- The price of a bond is determined by demand and supply. §4.c
- There is an inverse relationship between bond prices and interest rates. As the interest rate rises, bond prices fall, and vice versa. §4.c

#### 7. What are bubbles and panics?

- A bubble refers to a rise in the price of an asset that is not related to the future value of services provided by the asset. §5
- It is very difficult to know at the time whether a price rise is due to fundamentals or is a bubble. §5.a
- The value of an asset is the discounted value of the future earnings or value of services provided by the asset. §5.a
- The housing price appreciation during 2001–2006 is called the housing bubble. The price of purchasing a house relative to renting one rose to above-normal levels. §5.b

## KEY TERMS

|                                |   |                                |
|--------------------------------|---|--------------------------------|
| back-end load, 356             | front-end load, 355                     | mutual fund, 355               |
| bond, 361                      | global fund, 355                        | no-load fund, 356              |
| bubble, 366                    | index fund, 355                         | socially responsible fund, 355 |
| comparable investment, 358     | load, 355                               | specific fund, 355             |
| coupon, 363                    | market capitalization (market cap), 354 | zero-coupon bond, 364          |
| dividend, 351                  | maturity date, 361                      |                                |
| face or <i>par value</i> , 361 |   |                                |

## EXERCISES

1. What is saving? What role does it play in financial markets?
2. Investors know for sure that the CEO of firm A will undertake an investment that will yield \$100 million profit next year and then \$2 million each year after that for 10 years. They also know for sure that the CEO of firm B will undertake an investment that will yield nothing for two years and then a profit of \$20 million per year for 10 years. Which company will have the higher stock price today, next year, the second year, and the third year?
3. The investors in exercise 2 are surprised by firm B's performance in year 5. Instead of being \$20 million, the firm's profits are \$40 million. What happens to firm B's stock price in years 6 and 7?
4. Nova Corporation just announced that it had a record year. Its earnings have increased nearly 10 percent. Explain how this announcement can lead to a decline in the price of Nova Corporation's stock.
5. The Benly Company needs to raise funds for a major expansion. The company is debating whether to issue stock or to issue bonds. If the company issues bonds, then its debt will increase and it will be under additional stress to ensure that its revenues can cover the costs of its debt. If it issues stock, the current owners will lose power and influence. What should the company do? Explain your answer.
6. The Federal Reserve just lowered interest rates. Explain the effect on bond prices.
7. In exercise 6, not only bond prices but also stock prices are affected. Explain why.
8. Suppose the price elasticity of demand for stocks is 1.5. This means that for every 10 percent increase in stock prices, the quantity demanded will decline by 15 percent. Does this price elasticity make sense? Explain.
9. Suppose the cross-price elasticity of demand between stocks and bonds is  $-1.2$ . If stock prices are expected to rise by 10 percent, what is expected to happen to bond prices? Does this make sense? Explain.
10. Which would you expect bonds and stocks to be, substitutes or complements? Explain.
11. From 2000 to 2003, stock prices declined by about 33 percent. Explain why this occurred. If stock prices have been falling for a period of time, what would cause them to rise again?
12. The price of a stock is determined by the demand for and supply of that stock. Both demand and supply depend on investors' expectations of the future performance—future economic profits—of the firm. Explain what happens to a firm's stock when the company earns less than investors expect.
13. During the second quarter of 2003, both bond prices and stock prices fell. Explain why this occurred.
14. Explain why stock prices fall when a company is found to be carrying out unethical and illegal activities.
15. What led to the rise in housing prices after 2001? Was this a housing bubble? If so, what event(s) popped the bubble?
16. The rental value of a domicile is the "fundamental value" of the domicile. The price of a house includes both the fundamental value and any expected appreciation of the property. Explain why the Price/Rent ratio is essentially the same for a domicile as the P/E ratio is for a stock.
17. What happens to an asset bubble when the amount of liquidity or money in circulation is reduced? Explain.

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



# BETTING ON BOB. THE NEXT THING IN STUDENT LOANS: INVESTORS PAY YOUR BILLS, YOU GIVE THEM A SHARE OF YOUR FUTURE

*Boston Globe*, November 30, 2008

**I**n 1997, David Bowie applied his well-known penchant for experimentation to finance: He offered to sell shares of his albums' future revenues. If you had faith in the enduring popularity of "Ziggy Stardust" and "Space Oddity," you could purchase Bowie Bonds and receive a percentage of the royalties for 10 years. In return, the aging rock star got an immediate infusion of cash.

When Miguel Palacios, a young Colombian financial analyst, heard the news of this arrangement, he had an epiphany. As a college student, he'd witnessed classmates reluctantly drop out of school because they couldn't afford to continue. Had they been able to offer their own version of Bowie Bonds, perhaps they could have earned their degrees.

"If he could do it," Palacios thought, "why couldn't all those bright, talented students do it as well?"

Other thinkers have begun to ask the same basic question. The result is an innovative way to think about paying for higher education. The idea, sometimes called human capital contracts, is that investors agree to cover the costs

of college or graduate school in return for a percentage of the students' future earnings over a fixed period of time. Since payments are scaled to wages, the odds of default—and of financial hardship for the graduate—are greatly reduced. This scheme transfers much of the risk from students to investors. But if the students earn handsomely, the investors stand to gain more than they would under a traditional loan.

Over the last few years, several companies have begun brokering these agreements in Europe and Latin America. One of these, Lumni, which Palacios cofounded, is laying the groundwork for operations in the United States, and its first few clients here plan to sign contracts by the year's end.


The contracts could offer a new way for students and their families to handle the burden of postsecondary education bills. In recent years, rising tuition costs, combined with limits on federal loans, have increasingly forced students to resort to private loans, which have markedly higher interest rates. The challenges of paying for college promise to intensify during the economic downturn. Disruptions in the

credit market have caused turmoil for student borrowers, while diminished endowments may force many colleges to jack up tuition rates even higher. Constraints on the federal budget will limit the options of President-elect Obama and the next Congress, regardless of their plans to aid students.

The system is straining, and both students and schools are looking for creative solutions. These contracts, proponents say, would allow more kids to finish college. They would free graduates from crushing debt. And they could liberate youngsters to pursue socially valuable but low-paying work such as teaching.

"We are putting all of the risk burden on students," says Kevin Carey, research and policy manager at Education Sector, a think tank, and coauthor of a recent article promoting this concept in *The American*, a magazine published by the American Enterprise Institute. "Our idea was to change that and allow students to pledge the most valuable thing they have—their intellectual capital."

The movement for human capital contracts is still small, with only a handful of companies offering them worldwide. And several



aspects of this invention could hinder its success in the United States. To function on a large scale, it requires a broad pool of students to spread the risk—tomorrow's doctors and lawyers, not just future artists and non-profit staffers. The former group, however, has less incentive to participate. The legal details also remain murky, as some advocates admit, prompting worries that graduates could wriggle out of their obligations, among other concerns.

What's more, the core idea strikes some critics as akin to indentured servitude. While they acknowledge that the analogy is in some ways inapt—graduates are free to pursue the careers of their choice, and debt, after all, imposes similar burdens—the notion that investors have a stake in a graduate's income can evoke uncomfortable associations for some.

"The whole thing makes me very nervous," wrote Sandy Baum, a professor of economics at Skidmore College and a policy analyst for the College Board, in an e-mail. "I don't like the idea of someone owning a piece of someone else."

The concept of human capital contracts was originally the brainchild of economist Milton Friedman. In 1955, he wrote a paper, later reprinted in *Capitalism and Freedom*, proposing that equity-like instruments, rather than debt, should finance higher education.

For Friedman, equity financing was a way to keep government out of the business of paying for higher education, and even today some supporters see it as an idea that could ultimately

lift the taxpayer burden of subsidizing grants and loans. Realistically, however, the current proposals would supplement, rather than replace, federal aid.

The chief benefit, as proponents see it, is that human capital contracts remove the risk of overwhelming debt for students, and mitigate the social costs of trying to repay it. Today, especially as more students take out private loans with high interest rates, many graduates struggle to make their monthly payments. Some of these graduates default, causing long-term credit problems for themselves, and costing lenders money. Others shape their career choices around the need to pay back their loans—for instance, law school students who aspire to do public interest work, but feel pressured by debt into taking corporate law jobs.

By gearing repayment to income, human capital contracts reduce those burdens sharply—a student who earns less money is obligated to pay less back. Of course, there is still a risk of default, and the system all but guarantees that investors would lose money on lower-income graduates—the ones who do take nonprofit jobs, or who fail to land lucrative positions. But investors would temper the risk by diversifying, funding a group of students with a range of future prospects.

"The best analogy is insurance," says Palacios. A car wreck, for example, would ruin an uninsured driver. "But not everybody crashes. If you pool everybody together, you are in a much better position."

In fits and starts, the theory of human capital contracts has begun to be realized in practice. In the spring of 2001, a company called My Rich Uncle launched, offering such contracts to more than 100 students. But the business was located on the 78th floor of the World Trade Center, so the attacks of Sept. 11 dealt it a severe blow. And in the recession that followed, says Raza Khan, one of the cofounders, investors were wary of gambling on unfamiliar ideas. The company has shifted to a more conventional private lending model, although Khan says they hope to resume the income-based contracts someday.

Also in 2001, Palacios and his partner, Felipe Vergara, founded Lumni, which has financed a total of about 150 students in Chile, Colombia, and Mexico. Students pay no more than 15 percent of their income, and in some cases as little as 1 percent, for up to seven years. The company's U.S. branch, based in San Francisco, is working with investors, foundations, and institutions to start offering contracts here. Next semester, Lumni's first clients in the United States—several MBA candidates—will begin to receive funding.

A far larger company following this model is Career Concept, based in Germany. Started in 2002 by three business school graduates, the company now finances about 2,000 students at 180 universities in more than 20 countries, mostly in the EU. Typically, students are obliged to repay between 3 percent and 10 percent of their income over a



period of between four and six years.

"We've proven that the model is working," says Rolf Zipf, one of the board members. Last year, a new company, Deutsche Bildung, started up in Germany to offer similar contracts.

The U.S. government has recently enacted policies to tackle some of the problems caused by student loan debt. Legislation passed last year introduces a cap on debt repayment for federal loans—students who opt for income-based repayment will not be required to pay more than 15 percent of their discretionary income—and forgives federal loans for graduates who spend 10 years in public service. These measures, which take effect next year, will surely help graduates, but they do not offer a comprehensive solution. There are still limits on federal loans, which means many students still need to turn to the private lending market.

The potentially lower payments explain why human capital contracts would draw students, but there are attractions for investors as well.

Human capital companies would essentially be creating a new type of asset, based on the wages of college graduates, offering investors another way to diversify their portfolios. An "educational fund offers you as an investor a very steady flow," said Zipf. "There is a protection against inflation. If inflation goes up, the income will go up."

The contracts could also provide a more targeted hedge for large employers. For example, a hospital could invest in medical

students, thereby protecting itself against a rise in salaries for doctors; if salaries grew, the rising cost to the hospital would be partly offset by the higher returns on the investment. In the same vein, Google might invest in computer science students, and Boeing in engineering majors.

Other investors could be motivated by philanthropic goals. Wealthy alumni might see this as a way to help students attend their high-priced alma maters. Certain foundations, which are working with Lumni in Latin America, see these contracts as a more sustainable alternative to scholarships.

Instead of doling out money with no strings attached, as in a conventional scholarship, foundations could require students to sign contracts. These would state that nothing is owed up to a certain point, but high-earning graduates would repay a percentage of their income, allowing the foundation to recycle that money into later classes. Schools themselves could also incorporate this strategy into their financial aid packages.

For all the potential benefits of human capital contracts, however, they pose multiple challenges in practice. They create an incentive for graduates to hide their income; they also make it easier for graduates to loaf on their couches instead of working, since no fixed payment is required. Lumni, Career Concept, and My Rich Uncle all say that they have addressed this risk with intensive evaluations—Lumni even employs psychologists—and rigorously designed contracts.

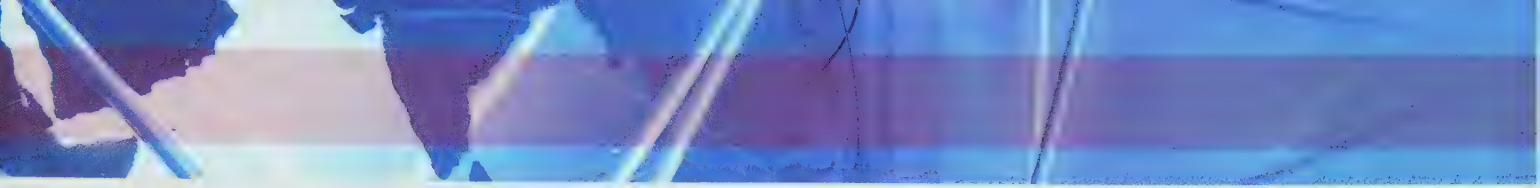
The other danger is what economists call "adverse selec-

tion." Why, after all, would students who anticipate fabulous success sign up to subsidize their less go-getting peers? A student who intends to be a high-flying investment analyst might calculate that the payments on a traditional private loan are likely to take a smaller bite out of her salary than those for a human capital contract would.

Companies have dealt with this problem by offering more favorable terms to likely high earners. A Harvard student majoring in economics, for example, would repay a lower percentage of future income than would an art major at a community college. Ultimately, the graduates who prosper still must subsidize the graduates who flounder, or who choose unprofitable careers. But proponents point out that all insurance works this way. Life insurance, for example, requires contributions from the healthy and the lucky in order to operate. "You don't say, I just wasted my premium because I just subsidized someone who died," says Ian Ayres, an economist and Yale law professor who supports the idea of human capital contracts.

Another worry is that the companies would discriminate against students from low-income backgrounds, either by offering them unfavorable terms or no contract at all, since they are less likely to enroll at prestigious institutions and excel academically. Proponents acknowledge that the contracts are not a panacea for higher-education financing, and that government financial aid would still play an important role. But if contracts help some





students, they say, government funds can be diverted to others. Altruistic investors may also target low-income students.

There are legal questions, too. It's not clear how the contracts would be enforced, how the IRS would treat them, and what would happen in the case of bankruptcy. My Rich Uncle declined to discuss the details of their contracts, but said that, having meticulously consulted lawyers, they did not encounter legal obstacles. If more companies begin to offer the contracts, these issues will no doubt be tested in court.

In addition to the benefits for students and investors, propo-

nents believe that if human capital contracts became widespread, they could actually influence higher education itself, by pushing schools to better prepare students for professional success. As investors became more sophisticated, they would offer better terms to students at schools that offer good value—measured in terms of the boost to earning power per dollar of tuition invested. Today, information about the economic worth of an education—about the jobs, promotions, and salaries of graduates—is surprisingly inaccessible for applicants. But companies would have the incentive,

and the resources, to find those data, which would be reflected in the contracts they offered for different institutions. In theory, this could eventually pressure schools that are low-performing, at least in this economic sense, to tackle their failings or lower their tuition.

"If college is doing a really bad job at all these things, students would start to see that," says Carey, author of the recent article in *The American*. "That will force colleges to pay more attention."

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REBECCA TUHUS-DUBROW

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**Source:** Rebecca Tuhus-Dubrow.

**T**he capital markets are innovative, move at almost instantaneous speed, and are global. Money flows at the touch of a button from anywhere to anywhere. When the Basel agreement required that developed countries use the same risk definitions for lending, the capital markets responded by creating new financial instruments that spread the risk around the globe. These new instruments—derivatives, credit default obligations, mortgage-backed securities, and others—were at the center of the 2007 housing and stock market collapses. Many politicians argue that these collapses should not have developed, that additional controls and regulations are needed. Some have even called for banning the development of such instruments.

If financial instruments and contracts such as the developments that led to the recession that began in 2007 are risky, what does that mean for financial instruments based on human capital? Capital markets considering new instruments called human capital contracts, or BOB (betting on Bob). How would they work? Could a market in such contracts be developed; could investors buy and sell shares of different people or bundles of human capital contracts? Capital refers to products such as machinery and equipment that are used in production. Human capital refers to the skills and attributes of a person that enables him to produce labor services. If capital can be financed through the capital markets, then why not human capital?

One reason that capital can obtain financing quite readily is that the value of that capital is easily determined. If the financial capital is not repaid, the capital might have value alone or in another use. Human capital is part and parcel of the individual. It cannot be separated from the individual. So if the borrower defaults or the person does not provide returns to investors, the capital cannot be taken and

used elsewhere. Can the person be thrown into debtors' prison or subjected to indentured servitude? No, those types of penalties are not legal.

If investors are willing to bet on Bob, then they have to take into account the risk of not collecting. Thus, the return required on the investment would be higher than the return required on a less risky investment. It does make sense that investors would predict the likelihood of high returns based on the majors and specialties of the individuals and offer different rates to different individuals. But this creates the possibility of moral hazard. Bob declares a major in economics and obtains an investment or loan based on his future expected earnings. Then Bob changes his major to sociology, which promises to return much less than majoring in economics. What can the investor do about it? Nothing, if the investor owns only the Bob contract. In the case of a stock market in human capital contracts, the investor would take a loss by selling the stock in Bob after Bob changed majors. Of course, there are also other problems, such as Bob becoming an alcoholic or a drug addict, or getting in an accident and destroying his chance of earning a living. These risks would tend to raise the rate of return the investor would require to make an investment in Bob.

If enough human capital contracts could be bundled together, such as in a mutual fund, the risk that Bob might default would be spread across all the individuals bundled in the fund. This is the way insurance works; high-risk and low-risk individuals are bundled together to spread the risk.

The capital markets are innovative, but can the problems in human capital contracts be overcome? Insurance firms are able to minimize moral hazard and adverse selection. Could mutual funds in human capital contracts do the same thing? Some firms are already trying it out. It will be interesting to observe how well they do.



## CHAPTER 17

# The Land Market and Natural Resources



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### FUNDAMENTAL QUESTIONS

- 1 What is the difference between the land market and the markets for uses of land?
- 2 What is the difference between renewable and nonrenewable natural resources?
- 3 What is the optimal rate of use of natural resources?

**G**lobal warming, the destruction of the rain forests, the depletion of the ozone layer, the extinction of animal species, and other environmental issues are of great concern to many people. So are the costs that people have to pay in the name of the environment: higher prices for cars as a result of emission controls, annual fees to test for emissions from cars, higher gas prices because of refining requirements, higher taxes to pay for cleaning up the environment, and so on. All of these issues occur in the “land market.” In this chapter we examine the market for land and natural resources.



# 1. Land

The category of resources that we call “land” refers not just to the land surface, but to everything associated with the land—the natural resources. Natural resources are the nonproduced resources with which a society is endowed. A market exists for each type of natural resource and for each use of land.



- 1 What is the difference between the land market and the markets for uses of land?

## economic rent

The portion of earnings above transfer earnings.

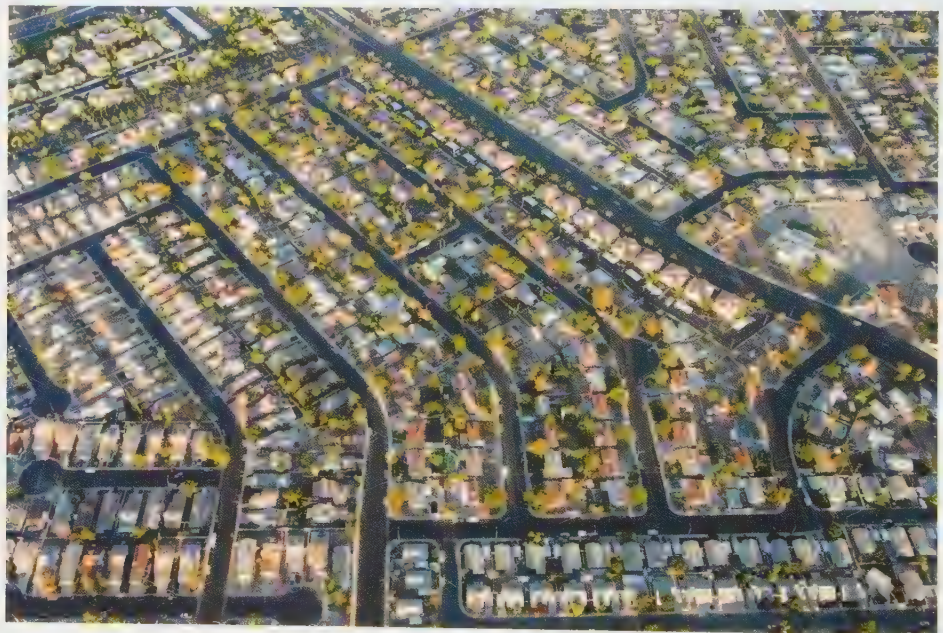
## transfer earnings

The amount that must be paid to a resource owner to get him or her to allocate the resource to another use.

## 1.a. Fixed Supply of Land: Economic Rent

The market for land is, in the most general terms, a market with a fixed supply. There is only so much land available. Obviously land is used in many different ways—for cities and housing, parks, wilderness areas, agricultural areas, and on and on. For each use of land, there is a market in which the typical demand and supply curves apply. For instance, the market for land on which to put housing has a demand curve that slopes down and a supply curve that slopes up. As the price of land available for housing rises, the quantity of land demanded for housing declines and the quantity of land available increases. However, in the general market for land, where there is a fixed supply of land, we have a downward-sloping demand curve but a perfectly inelastic supply curve.

Recall from the discussion of resource markets that when a resource has a perfectly inelastic supply curve, its earnings are called **economic rent**. If a resource has a perfectly elastic supply curve, its earnings are called **transfer earnings**. For resources with upward-sloping supply curves, earnings consist of both transfer earnings and economic rent. Transfer earnings are what a resource could earn in its best alternative use. This is the amount that must be paid to get the resource owner to “transfer” the resource to



This sea of roofs is the result of new homes built in Las Vegas, Nevada, the fastest-growing city in the United States until 2006. It then became the largest loser in the housing markets in major metropolitan areas. The demand for new housing means a demand for land on which to put new housing. Because the use of land for housing is more valuable than the use of the land as open desert, the land is reallocated. Water is a different matter. Las Vegas has no natural supply of water; instead, water is brought in from the Colorado River. Yet there is a huge demand for water to be used in swimming pools. As the population of Las Vegas continues to grow, the demand for water will continue to rise. Eventually, water prices will begin rising to match demand and supply.

another use. Economic rent is earnings in excess of transfer earnings. It is the portion of a resource's earnings that is not necessary to keep the resource in its current use.

You've seen that there are two different meanings for the term *rent* in economics. The more common meaning refers to the payment for the use of something—the rent on an apartment, for instance. The second use of the term *rent* is to mean payment for something whose quantity is fixed—that is, something that has a perfectly inelastic supply. The total quantity of land is fixed, so payment for land is economic rent.

The reason that the earnings of a good, service, or resource whose supply is fixed are called economic rent is to distinguish the result of changes in rent from that of changes in the price of a good, service, or resource that is not fixed in quantity. When the price of a good increases, everything else the same, the quantity supplied will increase. But when economic rent increases, quantity supplied cannot increase. Therefore, an increase in economic rent is simply a transfer from the buyer to the seller without any change in quantity.

As we saw in the chapter “Market Failure, Government Failure, and Rent Seeking,” the term *rent seeking* is used to distinguish the result of actions designed to gain additional income or wealth by seeking profits from the result of actions designed to do so by seeking rents. An increase in profits will bring on additional production and increased quantities supplied; an increase in rents simply transfers income from buyers to sellers. Rent seeking is not a productive activity; profit seeking is. Thus, economists refer to lobbying by individuals or groups to gain favors from the government as rent seeking. The resources devoted to the lobbying will not increase productive activities and quantities supplied; they merely transfer income and wealth from one individual or group to another. Rent seeking does not increase an economy's growth and improve its standards of living; profit seeking does.

## 1.b. Uses of Land

When we break the market for land into markets for uses of land, then the supplies are not fixed, and prices and profits function as they do in any other market: They allocate land to alternative uses. For instance, an increase in the demand for housing will drive the price of land used for housing up, inducing landowners to offer more of their land in the housing market. The land has to come from somewhere, so an increase in land devoted to housing means less land devoted to parks or agriculture or wilderness. The use of land is shifted to where the land has the highest value.

### RECAP

1. The total supply of land is fixed.
2. The payment to landowners is economic rent because there are no transfer payments that serve to allocate resources.
3. The amount of land devoted to any given use is not fixed. The use of land depends on the demand for and supply of that use.

## 2. Nonrenewable Resources

**Nonrenewable (exhaustible) natural resources** can be used only once and cannot be replaced. Examples include coal, natural gas, and oil. The market for nonrenewable natural resources consists of the demand for and supply of these resources. Supply depends on the amount of the resource, and the supply curve is perfectly inelastic. Only a fixed amount of oil or coal exists, so the more that is used in any given year, the less remains



- 2 What is the difference between renewable and nonrenewable natural resources?

**nonrenewable (exhaustible) natural resources**

Natural resources whose supply is fixed.



for future use. (This assumes that all sources of oil or coal are known.) But for any particular period of time, such as a year, the quantity that resource owners are willing to extract and offer for sale depends on the price of the resource. The supply curve in Figure 1(a) is upward sloping to reflect the relationship between the price of the resource today and the amount extracted and offered to users today. Resource owners are willing to extract more of a resource from its natural state and offer it for sale as the price of the resource increases.

When some of the resource is used today, less is available next year. The supply curve of the resource in the future shifts in, as shown in Figure 1(b) by the move from  $S_1$  to  $S_2$ . The shift occurs because the cost of extracting any quantity of the resource rises as the amount of the resource in existence falls. The first amounts extracted come from the most accessible sources, and each additional quantity then comes from a less-accessible source. For instance, in the late 1800s, oil became an important resource. At first, it was extracted with small pumps that gathered oil seeping out of the ground. Once that extremely accessible source was gone, wells had to be dug. Over time, wells had to be deeper and had to be placed in progressively more difficult terrain. From land, to the ocean off California, to the rugged waters off Alaska, to the wicked North Sea, the search for oil has progressed. New drilling technology has led to the collection of oil by the process of fracking or fracturing. Fracking is the process of drilling wells 10,000 feet below the surface and then hundreds of feet sideways, and then water and chemicals are used to blast into the rock to force natural gas and oil out of it.

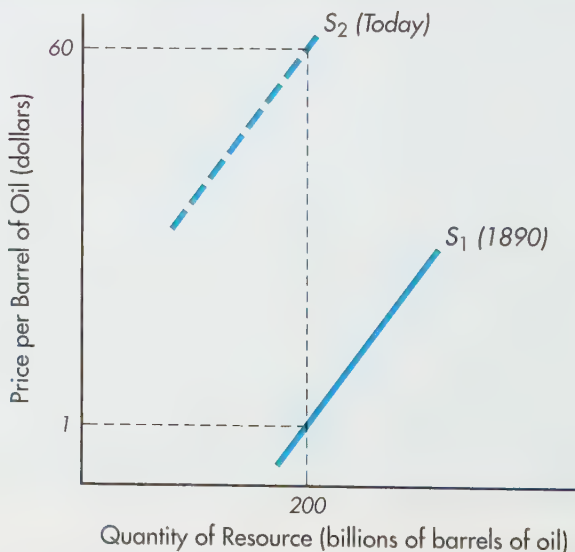
As more and more resources are extracted, the marginal cost of extracting any given amount increases, and the supply curve shifts up. If 200 billion barrels of crude oil are

**FIGURE 1** The Market for Nonrenewable Resources

**(a) Demand and Supply**



**(b) Costs of Extraction Rise over Time**



The demand curve slopes down, and the supply curve slopes up. The intersection of demand and supply determines the quantity used today and the price at which the quantity was sold, as shown in Figure 1(a). As quantities are used today, less remains for the future. Because the available quantities come from increasingly more expensive sources, the supply curve shifts in over time, as shown in Figure 1(b). The curve  $S_1$  represents the supply in 1890 and  $S_2$  represents the supply today. For the quantity supplied at 200 billion barrels, the price was \$1 per barrel in 1890, and today the price is \$60.



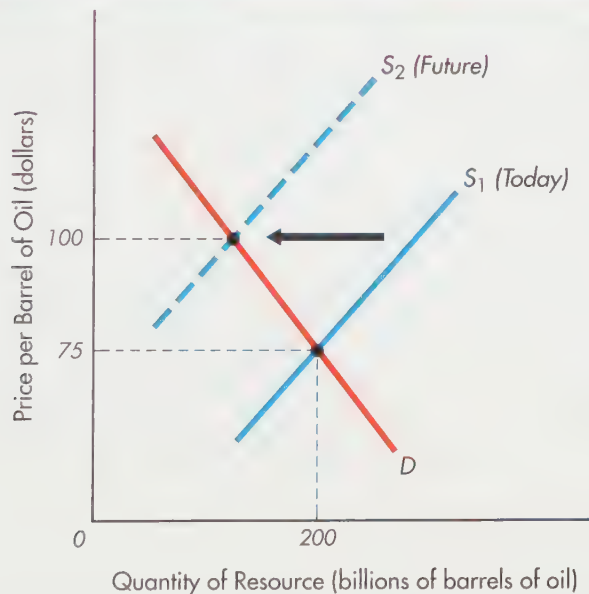
extracted this year, then the extraction of another 200 billion barrels in the future will be more difficult—more expensive—than the extraction of the 200 billion barrels was this year. This increase is illustrated by an upward shift of the supply curve in Figure 1(b).

The demand for a nonrenewable natural resource is determined in the same way as the demand for any other resource. It is the marginal revenue product of the resource. Thus, anything that affects the *MRP* of the nonrenewable resource will affect the demand for that resource.

Equilibrium occurs in the market for a nonrenewable natural resource when the demand and supply curves intersect, as shown in Figure 2. The equilibrium price, \$75, and quantity, 200 billion barrels, represent the price and quantity today. Extracting and selling the equilibrium quantity of 200 billion barrels today reduces the quantity available tomorrow by 200 billion barrels. This means that extracting the resource tomorrow is probably going to be more costly than extracting it today. Thus, the supply curve for the resource in the future lies above the supply curve for today— $S_2$  rather than  $S_1$ , if any of the resource is being consumed today. With a higher supply curve and the same demand, the price is higher, \$100 rather than \$75. Thus, the price in the future is likely to be higher than the price today if some of the resource is extracted and sold today.

The resource owner must decide whether to extract and sell the resource today or leave it in the ground for future use. Suppose that by extracting and selling the oil that lies below the land today, a landowner can make a profit of \$10 per barrel after all costs

**FIGURE 2** Price Today and in the Future



Equilibrium occurs in the market for an exhaustible natural resource when the demand and supply curves intersect. The equilibrium price, \$75, and quantity, 200 billion barrels, represent the price and quantity of the resource used today. Selling the equilibrium quantity of 200 billion barrels today reduces the quantity available tomorrow by 200 billion barrels. With a smaller and probably less-accessible quantity available, extracting the resource tomorrow is probably going to be more costly than extracting it today. Thus, the supply curve for the resource in the future lies above the supply curve for today,  $S_2$  rather than  $S_1$ , if any of the resource is being consumed today. With a higher supply curve, the price is higher, \$100 rather than \$75. Thus, the price in the future is likely to be higher than the price today.

of extraction have been paid. The owner could buy stocks or bonds with that \$10, put the money into a savings account, or use it to acquire education or marketable skills. If the interest rate is 10 percent, the owner could realize \$11 one year from now from the \$10 profit obtained today. Should the oil be extracted today? The answer depends on how much profit the resource owner expects to earn on the oil one year from now, and this depends on what the price of oil and the cost of extraction will be one year from now.

If the owner expects to obtain a profit of \$13 a barrel one year from now, the oil should be left in the ground. If the profit on the oil one year from now is expected to be only \$10.50, the oil should be extracted and the proceeds used to buy stocks or bonds or put in a savings account. The more that a simple bank account or interest-bearing investment yields, the more oil is extracted and sold. As the interest rate rises, more is extracted and sold today, and less is left for the future.

Because suppliers and potential suppliers continually calculate whether to extract now or in the future and how much to extract, an equilibrium arises in which the year-to-year rate of return for the resource equals the rate of interest on alternative uses of the funds. If the rate of interest is 10 percent a year, everything else held constant, the resource price will rise at a rate of about 10 percent a year (the rate of return must be 10 percent).

Suppose the interest rate rises above the current rate of return on the nonrenewable resource, oil. The higher interest rate means that producers will pump more oil out of the ground today and purchase stocks, bonds, or savings accounts with the money they get from selling the oil. More extraction means that the supply curve today shifts out and today's price falls. At the same time, the supply curve in the future shifts in (since less will be available in the future) and the future price rises. This will occur until the rate of return on leaving the oil in the ground equals the interest rate—that is, until the value of pumping the oil and selling it is the same as the value of the oil left in the ground. A higher interest rate implies the use of more resources today. Conversely, a lower interest rate implies the use of fewer resources today.



**3** What is the optimal rate of use of natural resources?

## RECAP

1. Nonrenewable natural resources are natural resources whose supply is fixed.
2. The market's role is to ensure that resources are allocated across time to where they are most highly valued. If more is used today, the return on saving the resource for future use rises.
3. The higher the interest-earning potential on financial investments, the more of the nonrenewable resource is extracted today.
4. The more a nonrenewable resource is consumed today, the less it is available in the future and the higher its price is in the future.

## 3. Renewable Resources

### renewable (nonexhaustible) natural resources

Natural resources whose supply can be replenished.

**Renewable (nonexhaustible) natural resources** can be used repeatedly without depleting the amount available for future use. Plants and animals are classified as non-exhaustible natural resources because it is possible for them to renew themselves and thus replace those used in production and consumption activities. The prices of renewable resources and the quantities used are determined in the markets for renewable resources. The role of the market is to determine a price at which the quantity of the resource used is just sufficient to enable the resource to renew itself at a rate that best satisfies society's wants.

Owners of forest lands could harvest all their trees in one year and reap a huge profit. But if they did so, several years would pass before the trees grew enough to be cut again. The rate at which the trees are harvested depends on the interest rate. A large harvest one year means fewer trees available in the future and a longer time for renewal to occur. This would suggest a lower price today and a higher price in the future. If the interest rate rises, everything else held constant, owners will want to increase harvesting in order to get more money with which to purchase stocks and bonds. This means harvesting more trees now and having fewer available in the future, thereby driving up the price of the trees that are not cut today. If the interest rate falls, owners will want to harvest fewer trees today. This means that today's price will rise and the future price will fall. As was the case with the nonrenewable resources, the market adjusts so that the resources are allocated to their highest-valued use now and in the future. The timing of the use of resources depends on the rate of interest.

Suppose you raise beef cattle and you want to remain in that business for most of your lifetime and eventually to pass it along to your children. You will sell only part of your herd each year to ensure that you will have a herd to raise next year, the year after, and so on. If you sell more in any one year, the size of your herd the next year will be smaller. If you sell the entire herd, you will have nothing in the future. What you want to do is to maximize your economic profit over the time periods during which you and your family remain in the business of cattle raising. Thus, you allocate the sale of your cattle over the various time periods. If the price of beef cattle increases rapidly one year because of mad cow disease in Britain, then you would sell more of your herd that year. Conversely, if the price of beef cattle falls substantially one year because of reports that eating beef causes heart disease, then you would sell fewer cattle that year. But even though the size of your herd varies with the price of cattle and the interest-earning potential of other financial investments, you don't sell off your entire herd unless you plan to get out of the cattle business. You retain enough cattle so they can propagate and replenish the herd.

The same principle applies to any renewable resource that is privately owned. The owner has the incentive to ensure that sufficient supplies exist in the future to maximize profits over all time periods. Some people argue that forests should not be privately owned because logging firms would raze or clear-cut the forests, leaving nothing for the future. But this makes no sense. No logging company that owns and logs its own forests would sell off all its trees unless it planned to get out of the logging business. When renewable resources are privately owned, the market ensures that resources are allocated between the current period and the future so those resources are used in the most valuable manner. The private owners want to maximize their profit over the current and future periods.

A problem arises with the current use of a resource, whether renewable or nonrenewable, when the resource is not privately owned. Recall from the chapter "Market Failures, Government Failures, and Rent Seeking" that private property rights are necessary if markets are to work. When common ownership exists, the common property is overused. Many natural resources are overused because they are not privately owned. For instance, many fish are overfished; some are nearly extinct. Many animals are overhunted; some are nearly extinct. Many forests are razed; these are owned commonly (by a government). Air, lakes, streams, and oceans are often overused or polluted because they are not privately owned.

In summary, the markets for nonrenewable and renewable resources operate to ensure that current and future wants are satisfied in the least costly manner and that resources are used in their highest-valued alternative now and in the future. When a



nonrenewable resource is being rapidly depleted, its future price rises and the value of using the resource in the future rises, so that less of the resource is used today. When a renewable resource is being used at a rate that does not allow it to replenish itself, the future price rises and the value of the future use rises, so that less of the resource is used today.

## RECAP

1. Renewable natural resources are natural resources that can be replenished.
2. The rate of use of renewable resources in a functioning market system is one that equalizes the rate of return on the resource and the return on comparable investments.
3. A problem arises with the current use of resources, whether they are renewable or nonrenewable, when the resource is not privately owned. When common ownership exists, the common property is overused. Many natural resources are overused because they are not privately owned.

## SUMMARY

1. What is the difference between the land market and the markets for uses of land?
  - The total amount of land is fixed. §1.a
  - Changes in the price of land do not change the quantity supplied. §1.a
  - There are many uses of land, and how much land is allocated to each use depends on the demand for and supply of land for each use. §1.b
2. What is the difference between renewable and nonrenewable natural resources?
  - Nonrenewable natural resources are inert resources—coal, oil, and so on—that are fixed in supply. §2
  - Renewable natural resources are resources that can regenerate, such as wildlife, flora, and fauna. §3
3. What is the optimal rate of use of natural resources?
  - The optimal rate of use of renewable resources is the rate that equates the expected return from using the resources and the expected return from not using them. §2
  - The optimal rate of use of nonrenewable resources is not zero. It is the rate at which the nonrenewable resource can satisfy society's wants now and in the future. §3

## KEY TERMS

economic rent, 378  
 nonrenewable (exhaustible)  
 natural resources, 379

renewable (nonexhaustible)  
 natural resources, 382

transfer earnings, 378

## EXERCISES

1. The market for some good or service is shown by the demand and supply curves below.
  - a. Illustrate what transfer earnings and economic rent are.
  - b. Explain what would occur if the demand for the good or service were to increase.



2. The market for some good or service is shown by the demand and supply curves below.
  - a. Illustrate what transfer earnings and economic rent are.
  - b. Explain what would occur if the demand for the good or service were to increase.



3. It is often stated that an artist is not famous until after he or she dies. Why do artists' works rise in

price much more rapidly after the artist is dead than during the artist's life? How does this relate to the land market?

4. How would you describe economic rent in the case of a movie star earning millions of dollars each year?
5. If the world's population is rising and the quantity of land is not changing, won't the world eventually run out of room? Explain, using the market for land.
6. Will the world ever run out of a nonrenewable resource? Explain.
7. Suppose the supply of oil that had not yet been used was suddenly lost as a result of a rupture in the earth. What would occur?
8. The difference between a renewable and a nonrenewable resource is that the renewable resource can be replenished. Is there a difference between the markets for the two types of resources? What is the "optimal" rate of use of either renewable or nonrenewable resources?
9. In 2003, Alan Greenspan, chairman of the Federal Reserve, convinced the Open Market Committee to reduce the interest rate to near zero percent in an attempt to stimulate spending in the economy and increase the growth of income and employment. What might this policy do to the use of natural resources? Explain.
10. Urban sprawl is described as the establishment of housing and commercial development increasingly far from the city center. What might be the effect on sprawl if it was the policy of a city to build the infrastructure—sewers, power, and other essential services—to these developments at the average cost to the city? If it built the infrastructure at the marginal cost to the city?
11. If a city's political leaders decided to limit sprawl by restricting residential and commercial development to an area within a prescribed distance from the city center, what would be the effect on land prices in the areas inside the development boundary and outside the development boundary?
12. Illustrate the effect of the destruction of the oil fields of Saudi Arabia on the oil market. Explain what then happens to the market for gasoline.
13. Why are environmental problems often said to be simply a problem of common ownership?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

# FAIR-TRADE COFFEE FIX; SMALL-SCALE PRODUCERS OFTEN END UP POORER, THANKS TO OUR GOOD INTENTIONS

*National Post*, May 14, 2011

Coffee is one of our guilty pleasures, and not only because of the calories that can be packed into a double latte. Many of us feel guilty that our pleasure is coming at the expense of the Third World coffee farmer, so much so that we gladly pay more for “fair-trade” coffee, which certifies that farmers receive more revenue for their crop.

Today, on World Fair Trade Day, we have something else to feel guilty about. That fair-trade cup of coffee we savour may not only fail to ease the lot of poor farmers, it may actually help to impoverish them, according to a study out recently from Germany’s University of Hohenheim.

The study, which followed hundreds of Nicaraguan coffee farmers over a decade, concluded that farmers producing for the fair-trade market “are more often found below the absolute poverty line than conventional producers.”

“Over a period of 10 years, our analysis shows that organic and organic fair-trade farmers have become poorer relative to conventional producers.”

These findings do not surprise me. I speak as someone who has had contact with various

Third World producers in my capacity as president of Green Beanery, a company I founded seven years ago to raise funds for Energy Probe Research Foundation, a federally registered charity that I manage. Green Beanery sells more varieties of coffee, including fair-trade and organic coffees, than any other company in Canada, giving me occasion to witness the nature of the fair-trade business, and hear first-hand of its impact on small producers that supply us.

The fair-trade business is filled with contradictions.

For starters, it discriminates against the very poorest of the world’s coffee farmers, most of whom are African, by requiring them to pay high certification fees. These fees—one of the factors that the German study cites as contributing to the farmers’ impoverishment—are especially perverse, given that the majority of Third World farmers are not only too poor to pay the certification fees, they’re also too poor to pay for the fertilizers and the pesticides that would disqualify coffee as certified organic.

Their coffee is organic by default, but because the farmers can’t provide the fees that certification agencies demand to fly down and check on their opera-

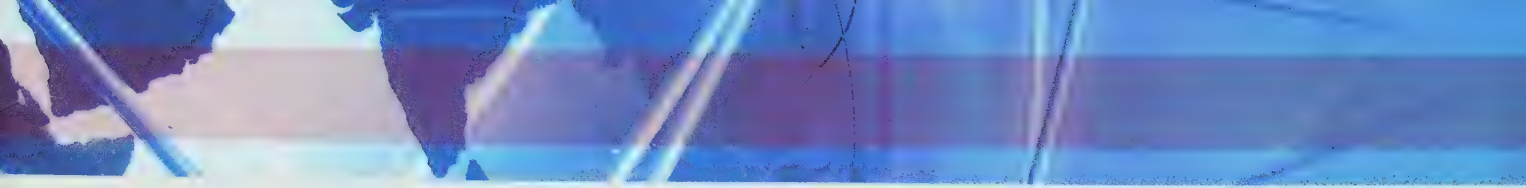
tions, the farmers lose out on the premium prices that can be fetched by certified coffee.

To add to the perversity, it’s an open secret that the certification process is lax and almost impossible to police, making it little more than a high-priced honour system. Although the certification associations have done their best to tighten flaws in the system, farmers and middlemen who want to get around the system inevitably do, bagging unearned profits. Those who remain scrupulous and follow the onerous and costly regulations—another source of inefficiency the German study notes in its analysis—lose out.

The study, published in the journal *Ecological Economics*, recommends that policy “move from certification schemes to investments in the farm and business management skills of producers”—in other words, phase out the certification fees.

Most merchants of certified coffees are aware of these contradictions, but most won’t be aware of other problems in the certification business. For Third World farmers to qualify as fair-trade producers, and thus obtain higher prices for their coffee, farmers must join co-operatives. In some Third World societies, farmers readily accept the compromises





of communal enterprise. In others, they balk. In patriarchal African societies, for example, the small coffee farm is the family business, its management a source of pride to the male head of the household. Joining a co-operative, and being told when and what and how to plant, entails loss of dignity.

The contradictions are acknowledged even by many fair-trade merchants, who often refer instead to anecdotal reports of less quantifiable benefits such as better health care or schooling in a village or even, most tangentially, improved habitat for birds or wildlife.

The contradictions extend to consumers of coffee in the West. Several years ago, I received a call from a church in Kingston, inquiring whether Green Beanery could supply it with freshly roasted fair-trade coffee on a weekly basis.

Along the way, the church officer mentioned that the parishioners wanted to do what they could to help poor farmers in the Third World. I replied that I'd be happy to supply the church, but I also advised him that fair-trade coffee

would not help the poorest of farmers—these smallholders are actually hurt when Western consumers forsake them for coffee produced by better-off farmers who can afford the certification fees.

I also mentioned that various coffees produced by small farmers in some of the neediest parts of Africa would taste superb while costing the church less, allowing it to spend the difference on some other worthwhile cause.

After a long pause, the church official replied something like: "I still think the parishioners would feel better knowing that they were drinking fair-trade coffee."

Some believe that certified coffee is superior in some way. But it is not always so. The small-scale farms whose local ecologies produce distinctive, niche coffee beans can't operate on a scale that would justify official certification. As the German study notes, "Certified coffees have distinct production and marketing systems with different associated costs than the conventional system."

Neither is certified coffee different at all. In fact, at Green Beanery we have received bags of coffee, some labelled fair trade, some not, grown on the very same farm and identical in every respect. The fair-trade certified farmer himself can't tell which beans will be sold as fair trade and which not—that decision is made by the higher-ups.

Because the fair-trade associations are intent on keeping the price of fair-trade coffee up, they limit the supply of coffee that can be labelled as certified. To the certified farmer's chagrin, most of his fair-trade certified crop could end up being sold as uncertified conventional coffee.

And in this well-intentioned price-fixing game, the fair-trade farmer is the pawn and the joke is on the customer.

LAWRENCE SOLOMON

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**Source:** National Post, May 14, 2011, Lawrence Solomon. Material reprinted with the express permission of: "National Post Inc."

Is it foolish to hope that consumers are willing and able to pay a premium to ensure poor country laborers are paid more? If every coffee consumer purchased only fair trade coffee, would the world be better off? In essence, fair-trade schemes ask us to pay more for things we are told have been farmed in a sustainable way by workers protected by International Labor Organisation conventions. If every consumer agreed to this, paying, say, 25 percent more for coffee, would the laborer end up with 25 percent more pay? How much additional pay, if any, the laborer would receive depends on the price elasticities of demand for and supply of coffee, and the demand for and supply of laborers. If consumers are willing to pay more for the coffee and purchase nearly as much, their demand is price inelastic. But if there is a very elastic supply of laborers, it is unlikely that the price premium that consumers pay would go to the laborers. Owners would have every incentive to keep the premium. Only if some monitoring and regulations were enforced, which would take some portion of the 25 percent premium, would the laborers be better off with the fair-trade regulations.

When people spend more of their incomes on coffee in order to ensure fair-trade practices, they are spending less on other goods and services. What happens to the laborers producing the goods and services on which consumers now spend less? Yes, their pay goes down. So the fair-trade policy has transferred wealth from non-coffee-related laborers to the coffee laborers. Is this "fair"?

According to the article, the unregulated market ends up with "... gross disparities of wealth, corruption, child labor, and sweatshops." Do free

markets create wealth inequalities? Yes, because in a free market resources are paid the value of their productivity; different skills and other characteristics will yield different pay. The amazing thing about the market is that this pay disparity has no inclination to stay in place; people have incentives to upgrade skills and increase productivity. People move up in income classes over time.\*

Child labor and sweatshops go hand in hand in the minds of the citizens of many developed countries. Sweatshops refer to manufacturing facilities in less-developed countries that have lesser working conditions and much lower pay than the workers in developed countries are used to. But a job in a sweatshop is often the best job a poor, unskilled person in a less-developed country can get. As long as people work voluntarily in the sweatshop, we know they are better off than they would be in the next best occupation. Child labor existed in the agrarian United States and even in the beginning of the U.S. industrial revolution. Again, as long as the labor was provided voluntarily, the children benefited. If forced into child labor, then the child is worse off and that is not consistent with a free market. People do not engage in voluntary trade unless they expect to be better off.

Although on the surface it seems that fair-trade regulations would help the poor in the poor nations, the logic of economics suggests otherwise.

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\* Edward Browning, in *Stealing from Each Other* (Westport, CT: Praeger Publishers, 2008), notes that, when adjusted for government transfers and other issues, incomes in the United States have not become more unequal.



## CHAPTER 18

# Aging, Social Security, and Health Care



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### FUNDAMENTAL QUESTIONS

- 1 Why worry about Social Security?
- 2 Why is health care heading the list of U.S. citizens' concerns?

**T**he population of the United States is aging rapidly. Currently, more than 12 percent of the population is retired—living off pensions, savings, and Social Security. By the year 2030, 21 percent of the population will be older than 65. The aging of the population is likely to have a dramatic effect on living standards. For instance, the elderly will increasingly influence the types of goods and services produced. In particular, expenditures on health care will continue to rise. The aging of the population also means that an increasing percentage of people will be retired and a smaller percentage will be producing goods and services and paying taxes. What are the implications for Social Security and for productivity? In this chapter, we look at the impact of an aging population on medical care and Social Security.



# 1. Aging and Social Security

In the United States, persons 65 years or older represent more than 13 percent of the total population, about one in every eight Americans, and the oldest group of Americans is getting older. In 2009, the 65 to 74 age group was more than 8 times larger than in 1900, but the 75 to 84 age group was more than 12 times larger, and the 85-plus age group was more than 22 times larger. The median age in 1850 was 18.9. It is now approaching 40.

The pattern of aging is clearly visible in Figure 1, which shows the percentage of total U.S. population that is 65 years old or more than 65 years old.



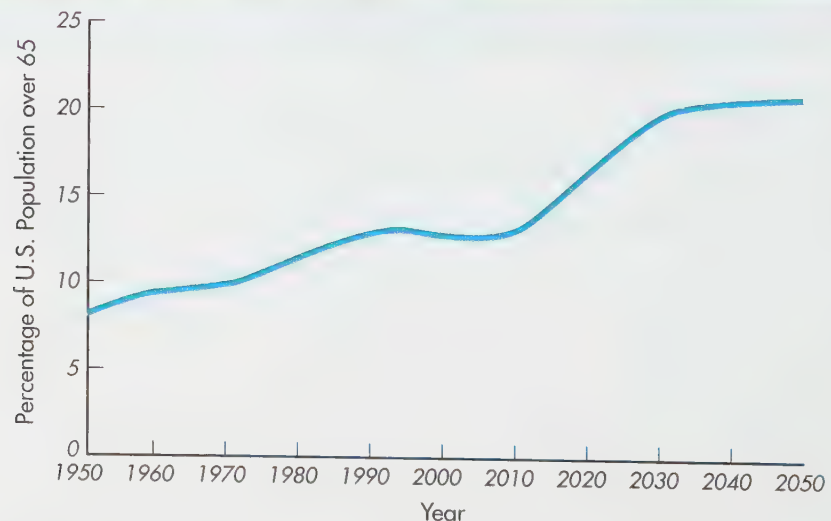
## 1 Why worry about Social Security?

### 1.a. Social Security

Old-Age, Survivors, and Disability Insurance (OASDI), also known as Social Security, had been established in 108 countries by the beginning of 1975. Some of the oldest plans are those of Germany (1889), the United Kingdom (1908), France (1910), Sweden (1913), and Italy (1919). The United States did not enact a national retirement program until 1935. Before these programs were instituted, the elderly were taken care of by family, organizations, and religions. It was not uncommon to see several generations living in one house or for people to belong to voluntary associations such as Moose, Elk, and other so-called “friendly societies.” Once the government took over care for the elderly, the membership in friendly societies declined and very few households had more than parent and child. Grandparents and great grandparents lived on their own or in care facilities.

The Social Security system in the United States, which covers both Social Security and hospital insurance (Medicare), is financed by a payroll tax, Federal Insurance Contributions Act (FICA), which is levied on the employer and the employee in equal

**FIGURE 1** Growth in Population Age 65 and Over



It is clear that the United States population is aging. The growth of people 65 or over is currently about 13 percent of the total population but will rise to 20 percent by 2030.

Source: <http://www.whitehouse.gov/omb/budget/fy2009/outlook.html>.

portions, although in 2011 the portion levied on the employee was decreased (4.2% for employees, 6.2% for employers in 2011). The initial FICA tax rate was 1 percent of the first \$3,000 of wage income paid by both parties. In 2011, the tax rate for employers was 6.2 percent on the first \$106,800 of earnings on both parties (although the rate on employees was temporarily reduced to 4.2%) for the Social Security contribution and 1.45 percent on all earnings for the Medicare contribution. For a self-employed person, the tax rate is 12.4 percent for Social Security and 2.9 percent for Medicare.

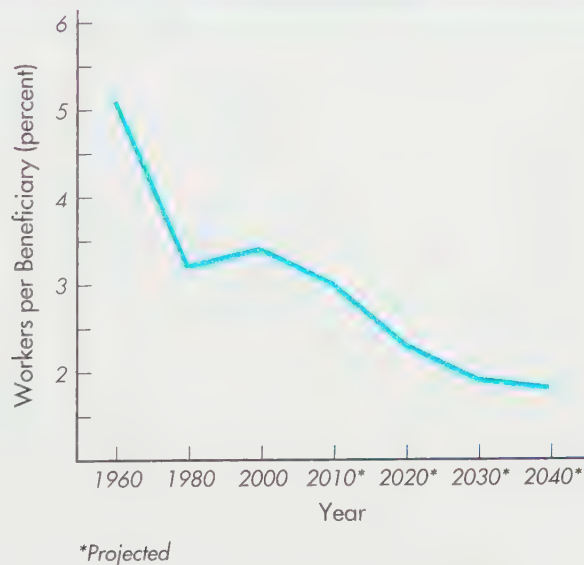
## 1.b. The Viability of Social Security

The Social Security taxes that the working population pays today are used to provide benefits for current retirees. The Social Security system is called a pay-as-you-go system. Taxes collected are paid to current retirees and any surplus is given to the Treasury. As a result, the financial viability of the system depends on the ratio of those working to those retired. The age distribution of the U.S. population has affected this viability. As illustrated in Figure 2, the ratio has declined from 16.5 in 1950 to about 3 today and is expected to decline to 2 by 2030. The situation in the United States is no different from that in many other parts of the world, as noted in the Global Business Insight “The World Is Aging.”

In the past two decades, the Social Security tax has risen more rapidly than any other tax. Social Security tax revenues were less than 5 percent of personal income in 1960 and currently exceed 11 percent of personal income. The revenues from the personal income tax were 3.4 percent of personal income in 1940 and rose to more than 15 percent in the early 1980s. Social Security expenditures also have risen more rapidly than expenditures for any other government program. Social Security, Medicare, and

*Social Security was intended to supplement the retirement funds of individuals.*

**FIGURE 2** Social Security Viability



The ratio of workers to Social Security beneficiaries is shown. The ratio has declined from 16.5 in 1950 to about 3 today and is expected to decline to 2 or less by 2030. This trend means that the source of Social Security benefits is getting relatively smaller. The viability of the system depends on whether the trends of recent years continue.

**Source:** Social Security Administration.

# GLOBAL BUSINESS INSIGHT

## The World Is Aging

The United States is not the only country whose population is growing older. Most of the developed nations in the world are experiencing the same aging of their populations. As seen in the accompanying figure, in 1985 the elderly population constituted about 12 percent in the United States but nearly 17 percent in Sweden. Although three-quarters of the world's population resides in developing areas, these areas contain only about 50 percent of the world's elderly. The developed countries are aging because the birthrates in these countries have decreased and life expectancy has increased. Japan's life expectancy of 77 years is the highest among the major countries, but life expectancies in most developed nations approach 75 years. In contrast, Bangladesh and some African nations south of the Sahara have life expectancies of 49 years.

As longevity has increased and families have had fewer children, the ratio of persons 65 and older to persons age 20 to 64 has risen in most of the developed countries. These elderly support ratios will rise modestly over the next 15 years because the large number of people born between 1946 and 1961 will still be in the labor force. But as the large working-age population begins to retire after 2005, the elderly support ratio will rise sharply.

**Source:** U.S. Department of Commerce, U.S. Bureau of the Census, *International Population Reports*.



Medicaid outlays currently constitute 8.7 percent of GDP, whereas national defense is less than 4 percent, and education and training expenditures are less than 1 percent.

One of the concerns about Social Security is that Social Security taxes are not put into a place that is touched only when benefits are paid, that is, a trust fund. Instead, the money raised from the Social Security tax is used to purchase government



## ECONOMIC INSIGHT

### Myths about Social Security

There are several myths about Social Security. Here we examine just a few.

*We've contributed to that fund all our lives! It's our money! It's not the government's money!*

This is one of the most strongly and widely held myths about the Social Security system. In fact, the typical retiree in the 1980s and 1990s collected more than twice the amount represented by employer and employee contributions plus interest. Between 2000 and 2011, retirees collected more than they contributed by about 75 percent.

*The benefits of the system are determined by a scientific formula designed to ensure that the fund remains viable.*

Actually, the system of adjusting Social Security benefits annually as the cost of living increases dates only from 1975, and it came about as the result of political machinations, not foresight. In 1975, the annual benefits were about \$7,000. Attempting to hold the line on federal spending, President Nixon proposed a 5 percent increase in Social Security benefits and threatened a veto of anything

higher. Democrats saw an opportunity to embarrass the president. They decided to pass a 10 percent increase and force Nixon to make an unpopular veto. The 10 percent increase was introduced in the Senate, but then rumors that Nixon would double-cross them and sign the bill anyway began circulating. So Congress increased the benefits by 20 percent, knowing that this huge increase would be vetoed. Nixon, however, signed the bill and proudly boasted of how well he had taken care of the elderly. Congress, irritated at being outflanked, passed the cost-of-living adjustment program to show that it, too, cared about the elderly.

*Social Security ensures that only the elderly poor are cared for.*

In fact, there are at least a million individuals currently collecting Social Security benefits who have incomes exceeding \$100,000 per year.

*There is a surplus in the Social Security Trust Fund.*

There is no trust fund in which money is invested. The taxes collected are used to purchase Treasury bonds. It is these government bonds that make up the Social Security fund.

bonds—essentially giving the government a loan. The money the government gets from the loan is used to pay for general government expenditures. When the time comes for Social Security to cash in its IOUs to pay benefits, the federal government, which holds no assets earmarked for that contingency, pays the bill by issuing additional debt or raising taxes.

Another concern is that the amount paid into the Social Security system by an individual is far less, on average, than the amount received by that individual in retirement benefits. For example, people who retired in the 1980s, after working since the age of 21 at the minimum wage level, recovered all Social Security taxes paid—both employer and employee shares—in less than four years; an individual who earned the maximum taxable amount each year would recover the total contributions in only five years. Retirees in the 1990s recovered their total contributions and interest earnings in seven years. At the age of 82, the average worker who retired at age 65 will have received more than twice his and his employer's contributions to Social Security. Other Social Security issues are noted in the Economic Insight "Myths about Social Security."

So what's the alternative? There have been many proposals—increasing taxes, increasing the eligibility age, means testing, and holding down cost-of-living increases. The eligibility age—the age at which individuals can start collecting Social Security—was increased from 59 to 67 for those born in 1960 or later. Means testing—not paying Social Security benefits to anyone earning above a certain level of income—has been resisted but is under serious consideration. One of the more controversial proposals has been to privatize the system. This is what Chile, Australia, Turkey, Sweden, Italy, Argentina, Mexico, the Philippines, Great Britain, and several other nations have done.

Privatization allows individuals to choose among an approved list of possible investments rather than give the money to the government. What the individual earns on those investments will be the individual's retirement funds. Unlike the government program, which is a pay-as-you-go system and provides defined benefits to contributors, the private system will pay what individual investments earn. Some systems, like Chile's, are fully privatized: Workers are required to save a portion of their own salary for retirement, but they give no money directly to the government. Others, like Great Britain's, are partially privatized: Workers still pay taxes, but only part of this money is used to support a government-run system; the rest may be used for a private plan chosen by the worker. In Australia, workers are required to contribute 9 percent of their income to a fund of their choice.

The difference between what \$1 put into the Social Security system earns and what that \$1 would earn if it were invested in the stock market, for example, is very large. If individuals born in 1970 were allowed to invest in stocks the amount that they currently pay in Social Security taxes, those individuals could receive nearly six times the benefits that they are scheduled to receive under Social Security. Even low-wage earners would receive nearly three times what they would receive from Social Security.

But as good as this looks, people are critical of private investment because of the fear that many people will invest badly and end up with nothing. They look at what happened to the stock market in 2008 and wonder what would have happened to people who were planning to retire in 2009. Social Security, in contrast, seems to be a sure thing. Most of the privatization plans have met this criticism by ensuring that no one contributing to the new plan will receive less than he or she would have received under the former government-run plan.

The form of privatization differs from country to country, but the results have been uniformly positive. In every case, the returns that individuals have received have exceeded those of the government system. In addition, national savings rates have increased and government borrowing and debt creation have decreased.

## RECAP

1. The U.S. population is aging as a result of lower birthrates, higher life expectancy, and the impact of the baby boom generation.
2. Social Security, otherwise known as Old-Age, Survivors, and Disability Insurance, is financed by a tax imposed on employers and employees.
3. Social Security uses the current working population's contributions to provide benefits to the current retirees. As the population ages, the ratio of contributors to beneficiaries declines.
4. Solutions to the Social Security problem include means testing, increasing the eligibility age, and privatization.



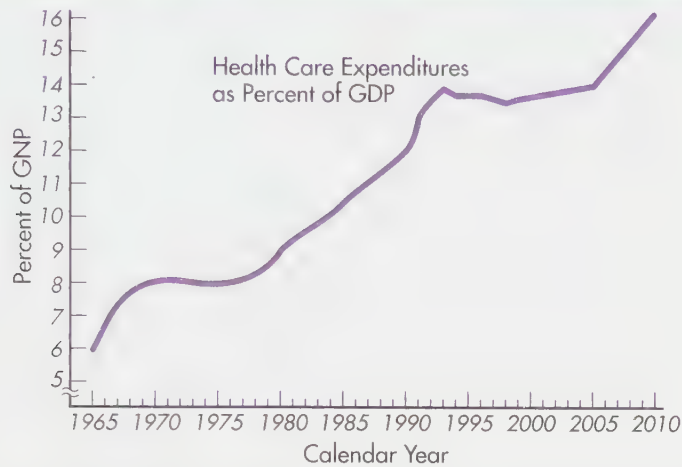
- 2 Why is health care heading the list of U.S. citizens' concerns?

## 2. Health Economics

Figure 3 shows that health care expenditures were only 5.9 percent of GDP in 1965 but exceeded 16 percent of GDP in 2010. (How this compares with other countries is shown in the Global Business Insight "Health Care Spending in OECD Countries.") What are the reasons that health care expenditures have risen so dramatically over that time?

### 2.a. Overview

Expenditures for hospital services constitute 31 percent of the nation's health care bill; nursing home expenditures, 8 percent; spending for physicians' services, 21 percent;

**FIGURE 3** The Growth of U.S. Health Care Spending

As a percentage of gross domestic product, health care expenditures have risen from about 6 percent in 1965 to over 17 percent in 2009.

**Source:** *Health Care Financing Review*, May 2009; Office of National Health Statistics, Office of the Actuary; [www.hcfa.gov/](http://www.hcfa.gov/); <http://www.nchc.org/facts/cost.shtml>.

spending for other personal health care services, 11 percent; spending on prescription drugs, 10 percent; and spending on medical equipment at retail stores, 13 percent.

Of the \$2 trillion spent on health care, private health insurance, the single largest payer for health care, accounts for 40 percent. Private direct payments account for 15 percent. Direct payments consist of out-of-pocket payments made by individuals, including copayments and deductibles required by many third-party payers (third-party payers are insurance companies and government).

Government spending on health care constitutes 45 percent of the total; the federal government pays about 70 percent of this. **Medicare**, the largest publicly sponsored health care program, funds health care services for about 40 million aged and disabled enrollees. The Medicare program pays for 20 percent of all national health expenditures and is rising due to part D, the drug benefit plan enacted in 2006. **Medicaid**, a jointly funded federal and state program, finances 16 percent of all health care, covering the costs of medical care for poor families, the neediest elderly, and disabled persons who are eligible for Social Security disability benefits. Other government programs pay for 9 percent.

Health care spending varies tremendously among various groups in the U.S. population. The top 1 percent of persons ranked by health care expenditures account for almost 30 percent of total health care expenditures, and the top 5 percent incur 55 percent of all health care expenditures. The bottom 50 percent of the population account for only 4 percent of these expenditures, and the bottom 70 percent account for only 10 percent of costs.

### Medicare

A federal health care program for the elderly and the disabled.

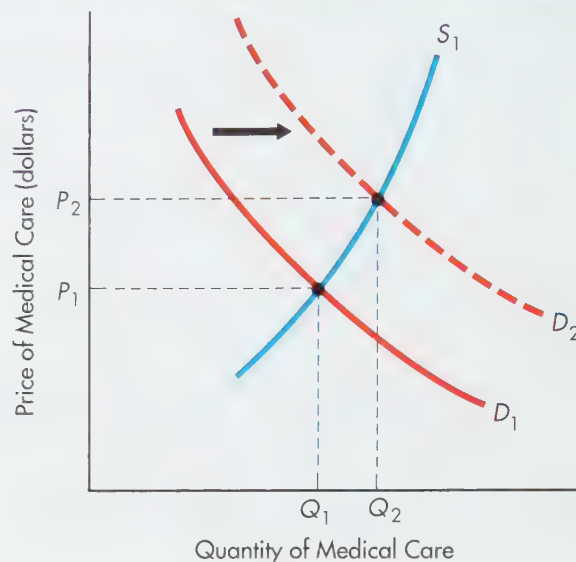
### Medicaid

A joint federal-state program that pays for health care for poor families, the neediest elderly, and disabled persons.

## 2.b. The Market for Medical Care

Rising costs or expenditures mean that the demand for medical care has risen relative to the supply (Figure 4). The initial demand for medical care is  $D_1$ , and the supply of medical care is  $S_1$ . The intersection determines the price of medical care,  $P_1$ , and the total



**FIGURE 4** The Market for Medical Care: A Demand Shift

The demand for and supply of health care determine the price of medical care,  $P_1$ , and the total expenditures,  $P_1$  times  $Q_1$ . Rising health care expenditures may be due to increased demand. A larger demand,  $D_2$  means a higher price and a greater total quantity of expenditures,  $P_2$  times  $Q_2$ .

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*Health care costs have risen because the demand for health care has risen relative to supply.*

expenditures,  $P_1$  times  $Q_1$ . An increase in demand relative to supply is shown as an outward shift of the demand curve, from  $D_1$  to  $D_2$ . As a result, the price of medical care rises, from  $P_1$  to  $P_2$ , as do the total expenditures on medical care, from  $P_1$  times  $Q_1$  to  $P_2$  times  $Q_2$ . What accounts for the rising demand relative to supply?

**2.b.1. Demand Increase: The Aging Population** The aging of the population stimulates the demand for health care. The elderly consume four times as much health care per capita as the rest of the population. About 90 percent of the expenditures for nursing home care are for persons 65 or over, a group that constitutes only 12 percent of the population. The aged (those 65 or older) currently account for 35 percent of hospital expenditures. In contrast, the young, although they constitute 29 percent of the population, consume only 11 percent of hospital care. Per capita spending on personal health care for those 85 years of age or over is 2.5 times that for people age 65 to 69 years. For hospital care, per capita consumption is twice as great for those age 85 or over as for those age 65 to 69; for nursing home care, it is 23 times as great.

**2.b.2. Demand Increase: The Financing Mechanism** For demand to increase, the aged must be both *willing* to buy medical care and *able* to pay for it. The emergence of Medicare and Medicaid in 1966 gave many elderly the ability to buy more health care. Medicare covers the cost of the first 100 days of hospital or nursing home care for the elderly and disabled, providing benefits to over 32 million people. Medicare also, since 2006, provides prescription drug benefits. Like Social Security, Medicare is funded by payroll taxes and is available on the basis of age (or disability), *not* need. By contrast, Medicaid helps only the neediest people, including many elderly people whose Medicare benefits have run out.

The effect of the Medicare and Medicaid programs has been to increase the demand for services and to decrease the price elasticity of demand because individuals do not pay

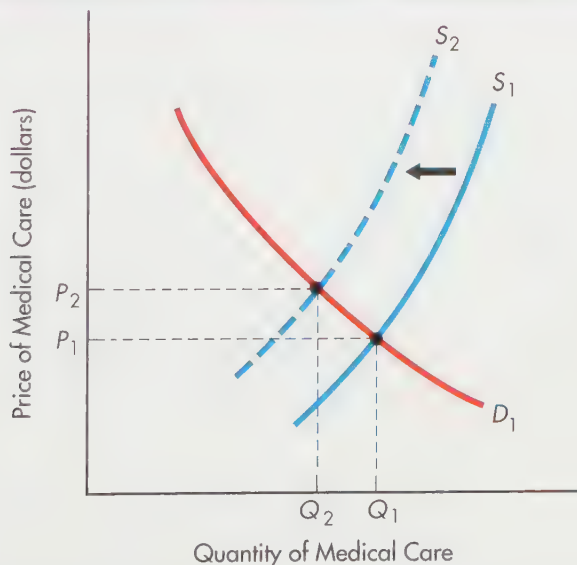
for much of their health care. Private sources pay for about 55 percent of personal health care for the population as a whole, and Medicare and Medicaid pick up most of the remainder. Private sources, however, pay for 74 percent of care for people under age 65. For the elderly, the private share of spending is only 15 percent for hospital care, 36 percent for physicians' services, and 58 percent for nursing home care.<sup>1</sup> Medicaid spending for those 85 or over is seven times the spending for people age 65 to 69 and three times greater than the spending for people age 75 to 79. This difference is attributable to the heavy concentration of Medicaid money in nursing home care, which those 85 or over use much more than others. Medicare spending for the oldest group is double that for the 65 to 69 age group.

**2.b.3. Demand Increase: New Technologies** New medical technologies provide the very sick with increased opportunities for treatment. Everyone wants the latest technology to be used when their life or the lives of their loved ones are at stake. But because these technologies are cost-increasing innovations and because costs are not paid by the users, the increased technology increases demand.

**2.b.4. Supply** Even if the demand curve for medical care was not shifting out, the cost of medical care could be forced up by a leftward shift of the supply curve, as shown in Figure 5. The supply curve, composed of the marginal-cost curves of individual suppliers of medical care, shifts up, from  $S_1$  to  $S_2$ , if the cost of producing medical care is rising—that is, if resource prices are rising or if diseconomies of scale are being experienced.

**Hospitals** The original function of hospitals was to provide the poor with a place to die. Not until the twentieth century could wealthy individuals who were sick find more comfort, cleanliness, and service in a hospital than in their own homes. As technological

**FIGURE 5** The Market for Medical Care: A Supply Shift



The rising cost of medical care may be caused by an increase in the costs of supplying medical care. The supply curve shifts up, from  $S_1$  to  $S_2$ , and the price of medical care rises, from  $P_1$  to  $P_2$ .

<sup>1</sup> *Health Care Financing Review*, various issues.



Levent Konuk/Shutterstock.com

Medical care in the United States is expensive, but it is technologically superior to that in other nations. If patients do not have to pay the higher costs of the higher-quality care and instead insurance or government pays it, then patients will want the highest-quality care. As long as they get paid, doctors and care facilities will provide the high-quality care.

changes in medicine occurred, the function of the hospital changed: The hospital became the doctor's workshop.

The cost of hospital care is attributable in large part to the way in which current operations and capital purchases are financed. Only a small fraction of the cost of hospital care is paid directly by patients; the bulk comes from *third parties*, of which the government is the most important. The term *third-party payers* refers to insurance companies and government programs: Neither the user (the patient) nor the supplier (the physician or hospital) pays.

In the past 20 years, the average number of beds per hospital increased by 50 percent, inpatient days declined by about 10 percent, lengths of stay declined by about 10 percent, and occupancy rates declined by nearly 20 percent. The problem that more beds per hospital and shorter stays create for the hospital is that the occupancy rate is only about 66 percent, whereas the efficient occupancy rate is between 80 and 88 percent.

**Physicians** Physicians affect the cost of medical care not only through their impact on the operation of the hospital, but also through their fees. Expenditures on physicians' services rose more rapidly than any other medical care expenditure category in the 1980s and 1990s.

The factors that have led to rising physicians' fees include an increase in demand relative to the supply of certain types of physicians, the ability of physicians to restrict price competition, and the payment system. The number of physicians per population has risen in many areas of the country. Yet because the American Medical Association restricts advertising by physicians, consumers are unable to obtain complete information about prices or professional quality, and physicians are less likely to compete through advertising or lower prices. Moreover, the restrictions on advertising enable established physicians to keep new, entering physicians from competing for their customers.



The payment system influences both physicians' fees and the supply of physicians. Over 31 percent of all physicians' fees are set by the government. Physicians are reimbursed on the basis of procedures and according to specialty. A gynecologist would have to examine 275 women a week to achieve the income earned by a cardiac surgeon doing two operations per week. More than 60 percent of all physicians in the United States are specialists. The payment system has induced more physicians to specialize in certain areas than would have occurred otherwise.

The costs of doing business have risen for physicians. For instance, the cost of malpractice insurance has increased about 25 percent a year during the past two decades. Although only about 1 percent of health care expenditures can be directly attributed to malpractice suits, there are some implicit costs associated with the fear of such suits. This fear has caused an increase in both the number of tests ordered by physicians and the quantity of medical equipment purchased by them.

**Prescription Drugs** The fastest-growing health expenditure category since 1995 has been prescription medicines. Prescription drug expenditures grew by an annual average of 15 percent during this period. Again, looking at the demand for and supply of prescription drugs explains the increase. Medicare has increased the ability to buy drugs. In addition, the existence of new drugs raises the demand for drugs as people seek better medicines and previously unavailable cures for diseases. On the supply side, the cost of producing a new drug has risen dramatically; on average it exceeds one billion dollars. Part of the production cost is caused by government restrictions regarding which drugs can be placed on the market in the United States. The only way a company can sell a new drug or medical device in the United States is to get permission from the Food and Drug Administration (FDA), and the FDA is increasingly reluctant to give this permission. It has a very strong incentive to keep unsafe products off the market, even if in doing so it may block beneficial new products. As a result, the FDA has made it increasingly difficult to bring a new drug to market. The time required to bring a new drug to market, including preclinical testing, clinical development, and regulatory review, has increased from a low of 6.3 years in 1963–1965 to 16.1 years. This delay means that the percentage of drugs that are available first in the United States is low. Although more than 60 percent of biopharmaceutical products approved in the United States, Europe, or Japan originated in the United States, less than 18 percent were first marketed in the United States. The latest estimate of the cost to develop a new drug and bring it to market exceeds \$800 million; in 1987 the cost was \$231 million.<sup>2</sup>

## 2.c. Do the Laws of Economics Apply to Health Care?

Many people claim that the laws of economics do not apply to health care and that is why the government must be responsible for health care. People tend to look at health care as a right, something that everyone is entitled to regardless of costs. You may recall our survey and discussion about allocation mechanisms in the chapter “Markets, Demand and Supply, and the Price System”; most people look at health care as something different from other goods and services. They do not want the market system to determine who gets health care and who doesn't.

Is health care a scarce good? The answer is a clear yes; at a zero price, more people want health care than there is health care available, the definition of a scarce good. Scarcity means that choices must be made, that there is an opportunity cost for choosing to purchase the scarce good. The choice is made on the basis of rational self interest. These principles of economics suggest that health care is an economic good and is subject to the laws of economics.

<sup>2</sup> Denise Myshko, “Pricing—The Cost of Doing Business,” *PharmaVOICE*, March 1, 2002 ([www.websterconsultinggroup.com/pharmapricing\\_030102.html#head1](http://www.websterconsultinggroup.com/pharmapricing_030102.html#head1)). Tufts Center for the Study of Drug Development, 2004; <http://csdd.tufts.edu/NewsEvents/RecentNews.asp?newsid=6>.

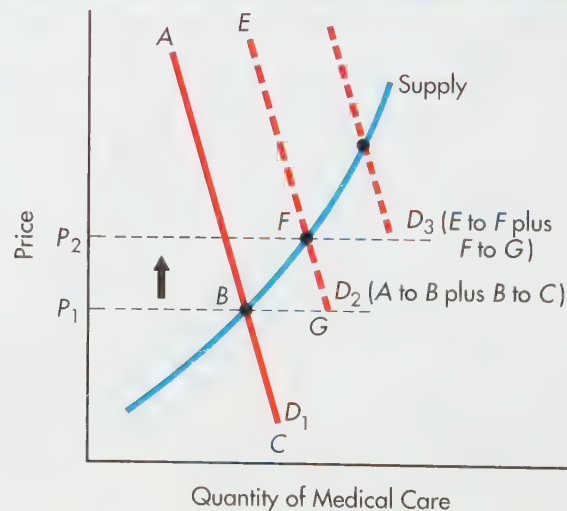
The demand curve for medical care looks like any other demand curve; it slopes down because the higher the price, the lower the quantity demanded. The demand curve is probably quite inelastic. There also is a standard-looking supply curve. Physicians, hospitals, and medical firms offer an increasing quantity of medical care for sale as the price rises. As shown in Figures 4 and 5 and repeated in Figure 6, the demand and supply curves look no different from the curves representing a market for any other economic good.

In Figure 6, the price for medical care is the level at which the demand and supply curves intersect, the point of equilibrium. At price  $P_1$ , the quantity of medical care demanded is equal to the quantity supplied. Those people who are willing and able to pay price  $P_1$  (all those lying along the demand curve from  $A$  to  $B$ ) get the medical care. Those who are not willing and able to pay the price (all those lying along the demand curve from  $B$  to  $C$ ) do not get the care.

The problems that arise in the health care market are due not to a repeal of the laws of economics, but instead to the nature of the product. People believe that they and others have an inalienable right to medical care—that it is not right to ignore those people making up the demand curve from  $B$  to  $C$  on  $D_1$ . As a result, government programs such as Medicare and Medicaid have been created. These programs, along with private insurance programs, mean that most of the payments for medical care are made by third parties, as described earlier in this chapter. The third-party payment system allows many of those who would not otherwise be willing and able to purchase health care, those lying along the demand curve from  $B$  to  $C$ , to be able to purchase the care. This shifts the demand curve out, which drives health care costs up, as shown by the shift from  $D_1$  to  $D_2$  in Figure 6.

*“Repealing the laws of economics” in the case of health care means that the demand for and supply of health care do not determine the price or quantity and that it is not just those who are willing and able to pay who get the care.*

**FIGURE 6** Do Laws of Economics Apply to Health Care?



The price of medical care is the level at which the demand and supply curves intersect, the point of equilibrium. At price  $P_1$ , the quantity of medical care demanded is equal to the quantity supplied. Those people who are willing and able to pay price  $P_1$  (all those lying along demand curve  $D_1$  from  $A$  to  $B$ ) get the medical care. Those who are not willing and able to pay the price (all those lying along the demand curve from  $B$  to  $C$ ) do not get the medical care. The third-party payment system allows many who would not otherwise be willing and able to purchase health care (those lying along the demand curve from  $B$  to  $C$ ) to be able to purchase the care. This shifts the demand curve out and drives health care costs up, as shown by the shift in the demand curve from  $D_1$  to  $D_2$ .

The government and private insurance programs thus face ever-rising health care costs. Each new equilibrium means that some are unable to afford the care; if their demand is covered, the demand curve shifts out again, to  $D_3$ . This continues as long as someone is willing and able to pay the price. That someone has been the government, principally through Medicare, and private employers through employee benefit plans. The result has been double-digit price increases for health care for over a decade.

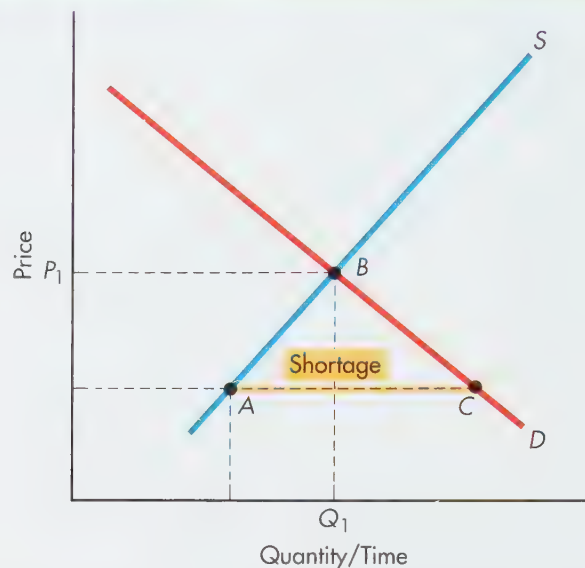
**2.c.1. The Market for Human Organs** Many respected doctors, lawyers, economists, and ethicists argue that a legal and open market in organs, such as kidneys, hearts, and livers, could help cure the chronic organ shortage that is gripping transplant medicine. If the price is right and the seller is willing, why should someone not be allowed to sell a kidney? The debate over the issue is intense. Many who are against an open and free market in organs argue that it will result in exploitation of the poor. They point to cases in which black market activity has occurred, such as in India's poorest sectors, where, for about \$1,500, poor Indians have sold a kidney and in just a few years are back in poverty, with huge debts and with one less kidney. But how people choose to spend the money gained from selling an organ has nothing to do with the market for the organs. People may fritter away money, but that has nothing to do with where they earned the money. The debate over the market for organs must focus on the supply of organs and the lives saved or lost because of the existence of a market in organs or due to the fact that a market is not allowed.

Supporters of a free and open market argue that it would increase supplies of transplant organs and save many lives. In the United States alone, there are 50,000 people on dialysis waiting for a donor kidney. About 3,000 people die each year while waiting for a kidney transplant. Thousands also die while waiting for livers, hearts, and other vital organs, and the number of people dying is increasing each year.

How would a legal market work? One part of the market would be the purchase of organs from living individuals. A person would offer a kidney or a part of a liver (since only pieces of livers, not whole livers, are needed for transplant) for a price. The price would be set by demand and supply. A second part of the market would be organs harvested from people who die suddenly, such as those killed in accidents. These people would have sold their organs, such as lungs, hearts, and kidneys, in what can be called a "futures" market. The rights to harvest these organs after death could be purchased from donors while they were still living, at prices set by supply and demand. Donors would be paid for future rights to their organs. So you could sell the rights to your kidneys once you die and receive the payment today.

What would the outcome of such a market be? Let's use Figure 7 to illustrate the market for organs. The demand for organs would be price inelastic, since those who need the organs would be willing to pay just about anything they were able to pay to get them. The supply of organs is expected to be price elastic, at least once the price reaches some threshold level. For instance, a 10 percent increase in the price, say from \$100,000 to \$110,000, would induce more than a 10 percent increase in the number of organs offered for sale. And if a futures market developed, the supply would be price elastic, since everyone who now volunteers to donate organs would continue to do so, and many others would also do so because they would receive some income for almost no cost. The market for human organs would look something like Figure 7, where the equilibrium price would be  $P_1$  and the equilibrium quantity  $Q_1$ . What would the price be? In the United States in 2000, a kidney was auctioned on eBay. The government terminated the auction after only a few hours, but when it was stopped, the price had reached \$5 million. At the other end of the price range, the black market (illegal market) price of a kidney in India was about three times the average annual income, or \$1,500. Some studies predict that the supply of organs and the alternatives to organs created by



**FIGURE 7** The Market for Human Organs

The demand for transplant organs would be quite price inelastic, since people awaiting a donor organ would be willing and able to pay nearly any price to save their lives. The demand and supply would determine the equilibrium price and quantity.

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technological changes spurred by the profits possible would drive prices to a very low level, perhaps \$200, in just a matter of years.<sup>3</sup>

A black market arises when an item that some people are willing and able to buy and others are willing and able to supply cannot be legally traded. Black markets are less efficient or more costly than legal markets simply because traders have to be discreet, cannot meet buyers and sellers openly, and have no means to enforce agreements. As a result, the number of traders in the market is less than it would be in a legal market. Most of the evidence available regarding human organs shows that the market would be immensely larger if it were legal than the black market in human organs currently is.

The problem that most people have with the idea of a market in human organs is the potential for what they call exploitation. They point out that the organs would be going one way—from poor people to rich people, from the Third World to the First World or to rich people in the Third World. This is the way markets work—from those who are willing and able to sell to those who are willing and able to buy. Arguing that this result is bad is a normative argument, not a positive one. Similarly, the counterargument that a father who is desperate to provide a plate of rice for his starving family should be entitled to sell one of his kidneys on the open market is a normative argument. No matter what the normative viewpoints, there is a market for human organs; transplant surgery is a business driven by the simple market principle of supply and demand. The positive aspect of the issue is not who would gain and who would lose in a free, open market, because both buyers and sellers gain as measured by consumer and producer surplus, but instead, how does the current black market situation compare with a free, open, legal market?

<sup>3</sup> David L. Kaserman and A. H. Barnett, *The U.S. Organ Procurement System: A Prescription for Reform* (Washington D.C., The AEI Press, 2002).

**2.c.2. Why Does Competition Not Drive Price Down?** When the Mazda Miata was first introduced in the United States, the price in Southern California exceeded the price in Detroit by about 25 percent, with the result being that the supply of cars in Southern California rose as cars in Detroit were shipped out. When housing prices rose faster than inflation or prices of other assets, the quantity of houses on the market rose. In general, when the price in one sector rises relative to other sectors, resources flow to where they are more highly valued. In the case of medical care, demand and supply have caused prices to rise significantly faster than inflation or prices in other sectors of the economy. We should expect resources to flow into health care and reduce the differential between its prices and prices elsewhere. Why has this not happened?

We have mentioned a few reasons—restrictions on entry, for instance. The American Medical Association restricts the supply of physicians. The AMA limits who can give prescriptions to only its members; a few years ago, pharmacists were responsible for dispensing drugs. The government restricts entry of drugs to the U.S. marketplace. The Medicare system restricts the movement of resources from one area in the health care market to another. In sum, restrictions do not allow the market to work to allocate goods and services and resources to where they have the highest value.

The market for medical care is far from a free, unregulated market. The restrictions and regulations inhibit the entry and exit of firms and inhibit the effect of competition on prices. In fact, most of the problems of the health care area in the United States could be minimized by turning the health care markets into more freely functioning markets. For instance, eliminating the incentive for people to purchase much more health care than they would if they were using their own money would lower the demand for health care. This could be done with the use of Health Savings Accounts (HSAs), wherein an individual would receive a sum of money, say \$8,000 per year to spend on health care. If they do not spend it all they get to retain what is left. Some private companies are doing this with great success—such as grocers Whole Foods and Safeway. Currently, HSAs allow people to put a sum of money away tax free that they can then use to purchase health care. If Medicare and Medicaid were eliminated and those who would have been enrolled in those programs would be given HSAs instead, many malincentives of the current system would be eliminated.

Eliminating the reimbursement of physicians according to procedures would reduce the incentive of physicians to specialize in areas that are procedure-based. With HSAs, people would be much more discriminating in their purchases than when using Medicare or Medicaid. People would purchase only the care they feel they need. The resulting competition among providers would lower costs. The fact that this would occur is evident in two areas of health care where insurance has not played a role, laser eye surgery and cosmetic surgery. In both cases competition has lowered prices and increased quality.

Rather than moving the U.S. health care market toward more individual responsibility and free exchange, recent legislative actions have moved it toward increased government intervention and control. In 2010 the Democrats in the House and Senate, without any support from Republicans, enacted a law to enhance the role of government in the U.S. health care market.

### **2.c.3. The Patient Protection and Affordable Care Act of 2010 (Obamacare)**

At more than 2,500 pages and 500,000 words long, the 2010 health care law is the most significant transformation of the American health care system since Medicare and Medicaid. The Act requires that every American purchase a government-designed insurance package. It alters the insurance market and essentially turns insurers into something like public utilities where the companies are privately owned but rates, profits, and other aspects of business are regulated by the federal government. The legislation was and remains highly unpopular. Several states have passed acts that prohibit mandatory health

insurance, and numerous court challenges have been filed. As of this writing, the constitutionality of the Act is headed for determination by the U.S. Supreme Court.

The most controversial aspect of the law is its individual mandate, a legal requirement that everyone purchase health insurance that meets the government's "minimum care" specifications. Until the new law is implemented, people who believe they are healthy and/or don't otherwise want to purchase insurance do not have to. But, if the government plan is going to extend coverage, it has to include more low-risk individuals to offset the cost of the high-risk individuals that will be covered.

Other aspects of the law are that it takes the regulation of health insurance away from states and gives it to the federal government. It imposes many new regulations on insurance companies. One important restriction is to ban insurers denying coverage because of preexisting conditions. While this particular restriction is popular, many critics argue that people will not purchase insurance until they get sick. This is an "adverse selection" issue because insurance will only cover people who are sick.

The primary effect of the Act is to shift responsibility even more away from individuals to determine their health insurance and health care and give it to government. It moves health care away from market-based allocation and more toward government-based allocation.

## RECAP

1. Health care is the fastest-growing portion of total national expenditures.
2. The demand for medical care has risen at a very rapid rate. One reason for the increase is the introduction of Medicare and Medicaid and private insurance plans that make demand relatively inelastic. The aging of the population has also increased the demand for medical care.
3. The cost of providing medical care has risen because of increases in hospital costs and physicians' fees. Rising hospital costs are partly a result of the reimbursement plans of third-party providers and partly a result of the control of the operation of hospitals by physicians.
4. Physicians' fees have risen even though the supply of physicians has risen. The demand for medical services does not match the supply; reimbursement methods have led to higher rates of return in certain specialties and thus have drawn an increasing number of physicians to those specialties.
5. The laws of economics do apply to the medical arena. They apply even in the case of markets for human organs.
6. The Patient Protection and Affordable Care Act of 2010 (referred to as Obamacare) alters the market for health care by shifting decision making away from individuals and giving it to government.

## SUMMARY

### 1. Why worry about Social Security?

- Social Security is a government-mandated pension fund. In the United States it is funded by a tax on employer and employee. The current tax collections are used to provide benefits to current retirees. §1.a

### 2. Why is health care heading the list of U.S. citizens' concerns?

- The rapidly rising costs of medical care result from increases in demand relative to supply. §2.b

- The increasing demand results from the aging of the population and from payment systems that decrease the price elasticity of demand. §2.b.1, 2.b.2
- The reduced supply (higher costs of producing medical care) results from inefficiencies in the allocation of physicians among specialties and inefficiencies in the operation and organization of hospitals. §2.b.4



## KEY TERMS

medicaid, 395

medicare, 395

## EXERCISES

1. What is Social Security? What is Medicare? What is the economic role of these government programs?
2. Why have expenditures on medical care risen more rapidly than expenditures on any other goods and services?
3. Explain how both the supply of physicians and physicians' fees can increase at the same time.
4. Why are there more medical specialists and fewer general practitioners in the United States now than was the case 50 years ago?
5. What is the economic logic of increasing Social Security benefits?
6. What does it mean to say that people have a right to a specific good or service? Why do people believe that they have a right to medical care but do not believe that they have a right to a 3,000-square-foot house?
7. Suppose the objective of government policy is to increase an economy's growth and raise citizens' standards of living. Explain in this context the roles of retirement, Social Security, and Medicare.
8. Explain why the U.S. system of payment for medical procedures leads to higher health care costs than a system of payment for physicians' services.
9. Analyze the following solutions to the problem of Social Security.
  - a. The retirement age is increased to 70.
  - b. The FICA tax is increased.
  - c. Income plus Social Security payments cannot exceed the poverty level.
  - d. The total amount of Social Security benefits received cannot exceed the amount paid in by employer and employee plus the interest earnings on those amounts.
10. Oregon proposed a solution to the health care costs problem that was widely criticized. Under this solution, the state paid only for common medical problems. Special and expensive problems would not be covered. Using the market for medical care, analyze the Oregon plan.
11. What would be the impact of a policy that did away with Medicare and Medicaid and instead provided each individual with the amount that he or she had contributed to the Medicare program during his or her working life?
12. Why is a third-party payer a problem? Private insurance companies are third-party payers, and yet they want to maximize profit. So wouldn't they ensure that the allocation of dollars was efficient?
13. "We must recognize that health care is not a commodity. Those with more resources should not be able to purchase services while those with less do without. Health care is a social good that should be available to every person without regard to his or her resources." Evaluate this statement.
14. Explain and illustrate how a market for human organs could increase the amount of organs available and save lives. Explain and illustrate what would have to occur in order for the lives saved to decline as a result of a legal market for human organs.
15. Suppose firms provide health care coverage and drug benefits as part of their competition for employees. Suppose the government enacts a law that provides drug benefits to everyone, whether employed or not. What is the effect on employment and wages?
16. Why would the Patient Protection and Affordable Care Act of 2010 require everyone to purchase health insurance?
17. What is the moral hazard problem in banning insurance companies from denying coverage due to preexisting conditions?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

# WHY SELLING A KIDNEY IS SUCH A DISTASTEFUL TRADE

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**W**hose life is it anyway? asked a famous play about euthanasia. Now there's a similar question over the sale of human organs for transplant: Whose body is it anyway?

A BBC Scotland investigation broadcast last night found evidence of an illegal black market in transplant organs—not the well-documented “organ tourism” by wretched Third World donors, but people here in the UK exploiting the despair of the sick by offering up healthy kidneys at fancy prices.

Many, I expect, will find it hard to imagine anything more grasping, twisted or callous. Yet it prompted a distinguished former president of the International College of Surgeons, Nadey Hakim, to argue that the unmet need for organs is now so acute that those prepared to donate a kidney to help someone else survive should get paid.

Hakim's argument is that, since the illegal trade is going on, it would be better if people who exercised their right under the Human Tissue Act to offer strang-

ers a kidney for transplant were paid a set state fee.

That way, donor profiteering would be eradicated, and recipients could be judged by clinical need, not personal wealth.

Others would go still further. Why rely on the altruism of the few? In this age of eBay, every commodity has its price. Why should a healthy kidney, brought to market, be any different? What business is it of the state's if I choose to get by with one kidney rather than two? Whose body is it anyway?

Well, it may sound seductive as an argument, but it couldn't be more wrong. Trade in human organs is like trade in human lives or human souls: some things are just morally beyond the reach of the laws of supply and demand. As Billy Bragg once remarked, a market is a fine place to shop but a rotten place to be ill. The legislation was drafted to make room for those few fine folk whose compassion extends to sacrificing a kidney to save a stranger. It wasn't about creating a new industry for hucksters.

Charging to give a kidney is as wrong as charging to give blood.

Transplant entitlement is for the doctor, not the bank manager, to determine. Even Hakim's proposal, while better than an open market, fails the test. The principle of payment is no more acceptable for the bill being charged to the taxpayer. There's no reason to think it would prevent illegal trading while there's a profit to make.

Worse, it would tempt the poor to self-mutilate for money. I suspect some politicians would be only too ready to add a kidney count to the means test for benefits. We do need, urgently, to address the acute shortage of organs available for transplant. Britain has one of the lowest donor rates in Europe. But the right way to improve it is by “presumed consent” (an opt-out, rather than an opt-in regime) where fatalities occur, not by turning the clock back to the survival of the richest.

KEITH AITKEN

**Source:** Keith Aitken, Copyright 2008 EXPRESS SYNDICATION.

No one denies that an organ-shortage problem exists. Nearly 90,000 people are on waiting lists to get transplants. Every year, about 7,000 patients who need organ transplants die without getting them. The only legal way to get a transplant now is through voluntary donation. No country subscribes to an open, free market in human organs. But given the huge demand and the large shortage, people seek other ways to obtain what they need. The Internet allows a look at both sides of the issue: Advertisements placed by those seeking organs and those willing to sell organs abound. One ad from Korea provided information about health, blood type, and other crucial information regarding a man's kidney and liver. Another offered to sell at a price significantly lower than what was being mentioned in other ads.

Ignore for a moment what item we are talking about here. Look at a simple demand and supply diagram where the price is below the equilibrium. The shortage created is quickly erased as the price increases and the quantity supplied rises while the quantity demanded declines. If the price is not allowed to rise—if, in fact, the market is not allowed to legally exist—then the shortage will continue. Allocation of the scarce human organs will take place first come, first served or as government dictates. There will be no incentive for more human organs to be supplied or for anyone to come up with a technological innovation that might substitute for the human organs.

But if a market in the organs were made legal, the equilibrium would be reached as the quantity of organs supplied rose. So why does the public see it

as such a terrible thing for a market in human organs to be made legal?

One fear often voiced on this subject is that you will be attacked and your organs stolen from you. There are two counterarguments against this. First, for a market to exist, private property rights must exist, and these rights must be enforced. You own a car. Do you constantly fear that someone will throw you out of the car and steal it? Do you constantly fear that someone will break down the door to your house and take all your property? You do not fear these things because you know that the police and the courts will enforce the laws that give you the right of ownership. Do these terrible things happen? Yes, but they are not very common relative to the number of cars and houses owned. In the case of human organs, you own your body—it is your private property. No one will be able to steal your organs—there are serious penalties for doing so, just as there are for murder. The market would provide the incentive for people to offer their organs—perhaps not right away, but instead through a futures market, in which they agree to sell their organs when they die.

A legal market in human organs would help the poor; it is one means by which parents can support their families. If a legal market existed, the poor could sell organs—get money now and give up organs in the future as well as sell a kidney or liver now—and use the money to send their kids to school or simply to feed the family. A market for human organs would work in the developed as well as the developing world. In the United States today, there is a thriving market to induce women to furnish ova for infertile couples.



# Income Distribution, Poverty, and Government Policy

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### FUNDAMENTAL QUESTIONS

- 1 Are incomes distributed equally in the United States?
- 2 How is poverty measured, and does poverty exist in the United States?
- 3 Who are the poor?
- 4 What are the determinants of poverty?
- 5 Do government programs intended to reduce poverty benefit the poor?
- 6 Why are incomes unequally distributed among nations?



FRANCIS JOSEPH DEAN/DEAN PICTURES/NEWSOON; LOGO: © FROXX/SHUTTERSTOCK.COM

Income is what resource owners receive as payment for the use of their resources. Resource owners have incentives to increase the value of their resources—that is, to increase their income. They will innovate and adopt the latest technology in order to enhance the value of capital. They will acquire additional skills and education in order to increase their wages and salaries. They will redirect their land from agricultural uses to commercial uses when they gain from so doing, and they will make improvements to their land to enhance its value. Resource owners want to ensure that they get the highest value for the use of their resources, now and in the future.

In every society, different people own different resources and differently valued resources. This means that incomes vary from person to person. The United States is a wealthy society. Yet many Americans today are living on city streets, in parks,

under bridges, or in temporary shelters. Income is unequally distributed in the United States. However, even the poor in the United States are better off than the entire populations of other nations. In Bolivia, the average life expectancy is only 53 years, whereas in the United States it is over 78. In Burma, only about one-fourth of the population has access to safe water. In Burundi, less than one-fourth of the urban houses have electricity. In Chad, less than one-third of the children reach the sixth grade. In Ethiopia, average income is just \$120 a year. That is less than \$1 per day.

Why is Ethiopia so poor and the United States so rich? Would the poor in the United States be rich in Ethiopia? Who are the poor and the rich? Is the inequality of incomes something that can or should be corrected? These questions are the topic of this chapter. Previous chapters have discussed how the market system works to ensure that resources flow to their highest-valued uses, that output is produced in the least-cost manner, and that people get what they want at the lowest possible price. But the market does not produce equal incomes. Markets ensure that goods

and services are allocated to those with the ability to pay, not necessarily to those with needs, and definitely not in equal amounts to everyone.

One of the major controversies in economics over the last 100 years has been which system makes people better off—capitalism and free markets or socialism and government-controlled markets? In general, the answer is that capitalism and free markets lead to higher standards of living than government-run economies. The poorest nations in the world are the most repressive, and the wealthiest are the freest. Yet some wealthy nations attempt to ensure that incomes do not differ much from one individual to another. Sweden and Denmark, for instance, are wealthy societies in which government has a large role and family incomes do not differ much from one family to another. Hong Kong, on the other hand, has risen from a destitute little outcropping of China 50 years ago to one of the wealthiest societies in the world, and it has very little government involvement and wide differences in income from one family to another. In this chapter we discuss income distribution and how economic well-being is measured.

## 1. Income Distribution and Poverty

In March of each year, the U.S. Census Bureau conducts a survey of about 60,000 American families carefully selected to be representative of the whole population. Families are ranked in order of income from highest to lowest. Then they are separated into five equal-sized groups each containing a fifth of all families. The highest income fifth contains the 20 percent of families who have the highest incomes, the second fifth contains families with incomes between the 60th and 80th percentiles, and so on. Then the total income of the families within each fifth is summed and that sum is expressed as a percentage of the total income of all families. The result is five percentages that give the share of total income received by each fifth of families. Table 1 shows the results for 2005–2009. In 2009, the lowest fifth, containing the 20 percent of families with the lowest incomes, received 4.1 percent of total income, while the highest fifth received 47.3 percent.



**1** Are incomes distributed equally in the United States?



**TABLE 1** Income Distributions, 2005–2009

| Year                              | Lowest Fifth | Second Fifth | Third Fifth | Fourth Fifth | Highest Fifth | Top 5 Percent |
|-----------------------------------|--------------|--------------|-------------|--------------|---------------|---------------|
| <b>Share of Aggregate Income*</b> |              |              |             |              |               |               |
| 2009                              | 3.9          | 9.4          | 15.3        | 23.2         | 48.2          | 20.7          |
| 2008                              | 4.0          | 9.6          | 15.5        | 23.1         | 47.8          | 20.5          |
| 2007                              | 4.1          | 9.7          | 15.6        | 23.3         | 47.3          | 20.1          |
| 2006                              | 4.0          | 9.5          | 15.1        | 22.9         | 48.5          | 21.5          |
| 2005                              | 4.0          | 9.7          | 15.3        | 22.9         | 48.1          | 21.1          |
| <b>Mean Income*†</b>              |              |              |             |              |               |               |
| 2009                              | 15,289       | 37,045       | 59,907      | 90,962       | 189,486       | 325,023       |
| 2008                              | 15,906       | 38,125       | 61,582      | 92,160       | 190,400       | 294,709       |
| 2007                              | 11,551       | 29,442       | 49,968      | 79,111       | 167,991       | 287,191       |
| 2006                              | 15,539       | 36,769       | 58,485      | 88,394       | 187,389       | 297,405       |

\*Families as of March of the following year.

†Income in 2009 dollars.

Source: <http://www.census.gov/hhes/www/income/histinc/f03AR.html>.

Clearly, incomes are not equal among families. This is to be expected in a market-based economy. People have different skills and abilities and earn different incomes as a result. But how much inequality is there, and can too much inequality be a bad thing? It is not easy to measure income inequality. We have to decide what should be counted as income and whether income is a better measure of people's standards of living than some other measure, such as their expenditures. Then, once these choices have been made, a way to present the degree of inequality has to be chosen.

### 1.a. Income Inequality

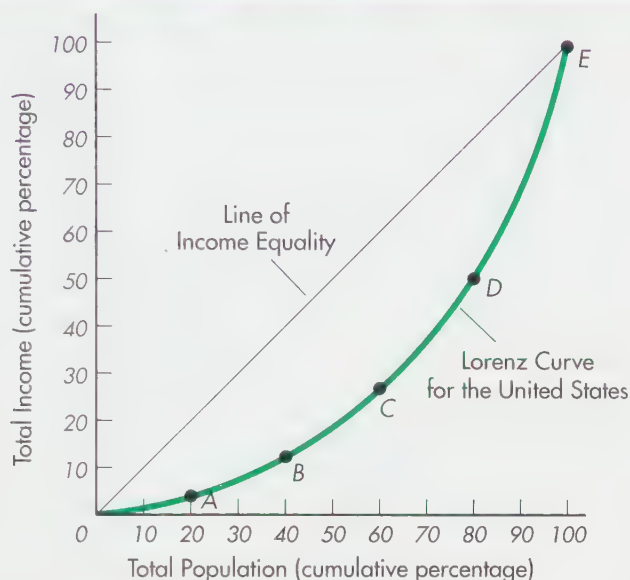
The most common way to present income inequality is using a graph known as the Lorenz Curve. Equal incomes among members of a population can be plotted as a 45-degree line that is equidistant from the axes (see Figure 1). The horizontal axis measures the total population in cumulative percentages. Cumulative means that as we move along the horizontal axis, we are adding up the percentages. The numbers end at 100, which designates 100 percent of the population. The vertical axis measures total income in cumulative percentages. As we move up the vertical axis, the percentage of total income being counted rises to 100 percent. A point half way up and half way out to 100 percent would be 50 percent of families and 50 percent of income. The 45-degree line splitting the distance between the axes is called the *line of income equality*. At each point on the line, the percentage of total population and the percentage of total income are equal. The line of income equality indicates that 10 percent of the population earns 10 percent of the income, 20 percent of the population earns 20 percent of the income, and so on, until we see that 90 percent of the population earns 90 percent of the income and 100 percent of the population earns 100 percent of the income.

Points off the line of income equality indicate an income distribution that is unequal. Figure 1 shows the line of income equality and a curve that bows down below the income-equality line. The bowed curve is a **Lorenz curve**. The Lorenz curve in Figure 1 is for the United States in 2009. It shows that the bottom 20 percent of the population received 3.9 percent of income, seen at point A. The second

#### Lorenz curve

A curve measuring the degree of inequality of income distribution within a society.



**FIGURE 1** The U.S. Lorenz Curve

The farther a Lorenz curve lies from the line of income equality, the greater the inequality of the income distribution. The bottom 20 percent of the U.S. population receives 3.9 percent of total income, seen at point A. The Lorenz curve is plotted by successively adding 10 percent of the population and each group's percentage of total income.

Source: <http://www.census.gov/hhes/www/income/data/historical/inequality/index.html>.

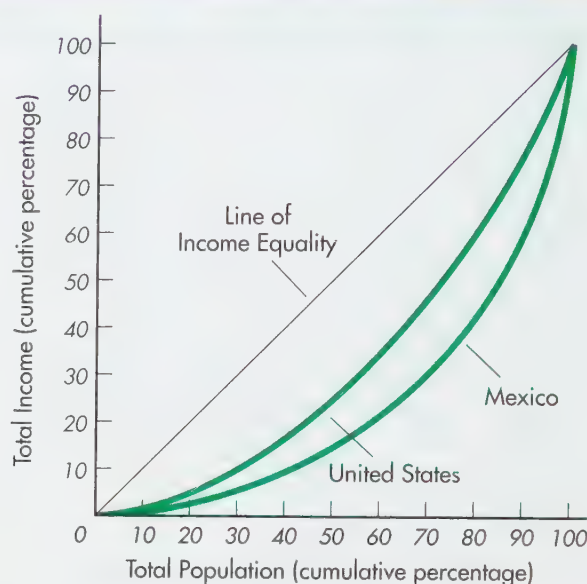
20 percent accounts for another 8.6 percent of income, shown as point B. The third 20 percent accounts for another 14.5 percent of income, so point C is plotted at a population of 60 percent and an income of 26.5 (3.4 + 8.6 + 14.5) percent. The fourth 20 percent accounts for another 23.2 percent of income, shown as point D. The richest 20 percent accounts for the remaining 50.3 percent of income, shown as point E. With the last 20 percent of the population and the last 50.3 percent of income, 100 percent of the population and 100 percent of income are accounted for. Point E, therefore, is plotted where both income and population are 100 percent.<sup>1</sup> Notice that the more bowed out the Lorenz curve, the greater the income inequality. For instance, in Figure 2 a comparison of income distribution in the United States and Mexico in 2009 is illustrated. You can see at a glance that incomes are more unequally distributed in Mexico than in the United States because the Lorenz curve for Mexico bows out farther than the U.S. curve does.

Another way you will see income distributions reported is with the **Gini coefficient**. The Gini coefficient is the area between the Lorenz curve and the line of perfect equality divided by the total area under the line of income equality. A Gini of 0 would occur if every family had the exact same amount of income, since there would be no difference between the line of income equality and the Lorenz curve. A Gini of 1 would occur if one family had all the income, since the Lorenz curve would be the rectangle going from 0 to 100 on the horizontal axis and from 100 on the horizontal axis up to the line

#### **Gini coefficient**

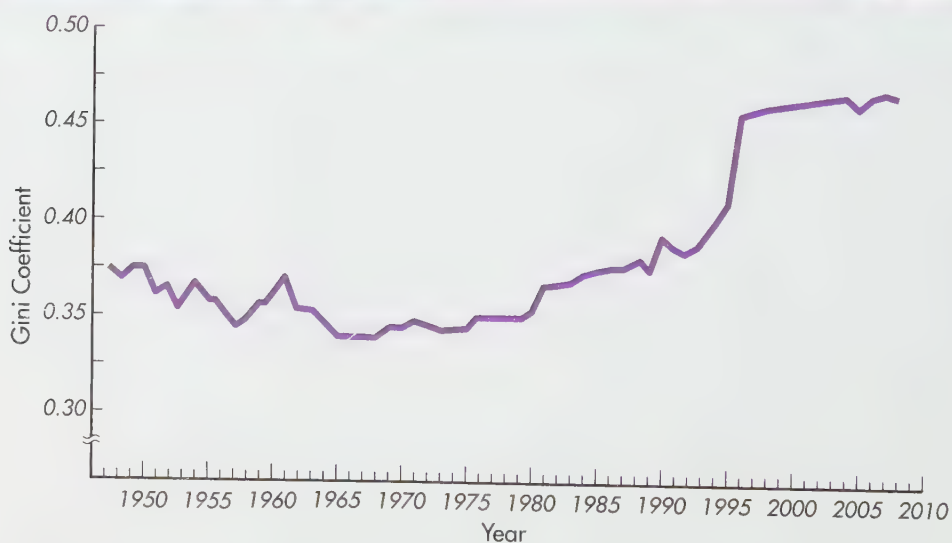
A measure of income inequality ranging between 0 and 1; 0 means that all families have the same income; 1 means that one family has all of the income.

<sup>1</sup> A Lorenz curve for wealth could also be shown. It would bow down below the Lorenz curve for income, indicating that wealth is more unequally distributed than income. Wealth and income are different and should be kept distinct. Wealth is the stock of assets. Income is the flow of earnings that results from the stock of assets.

**FIGURE 2** Lorenz Curves for Mexico and the United States

Based on data for the United States and Mexico, the two Lorenz curves show that total income in Mexico is distributed among Mexican citizens much more unequally than total income in the United States is distributed among citizens of the United States.

**Source:** Data are from *World Development Report*, 2009.

**FIGURE 3** The Gini Coefficient

The Gini coefficient is a measure of the dispersion of income that ranges between 0 and 1. A lower value indicates less dispersion in the income distribution: A Gini of 0 would occur if every family had the exact same amount of income, whereas a Gini of 1 would occur if all income accrued to only one family. Figure 3 shows that from 1947 to 1968, the dispersion of income fell gradually. Since then the dispersion has risen slowly.

**Source:** *Economic Report of the President*, 2000 and 2006.

of income equality—the entire area. According to Figure 3, the Gini coefficient was between .35 and .37 until the 1990s; it then increased and reached .469 in 2009. This means that the distribution of income in the United States has become more unequally distributed since 1968.

A simpler measure of income inequality is the ratio of the average income in the top fifth to average income in the bottom fifth, or the ratio of shares of the top fifth to the bottom fifth. This is called the HiLo ratio.<sup>2</sup> In 2009, as noted in Table 1, the ratio was  $189,486/15,289 = 12.39$ .

Notice that all of these measures are just indicators of inequality. They do not tell us what is too much or too little, whether an amount is good or harmful, or even whether absolute incomes are high or low. For instance, if all incomes double, the shares are unchanged even though everyone is better off. Thus, the shares are only indicative of relative inequality, how families stand relative to one another.

**1.a.1. Families or Households** The Census Bureau also provides income shares for households. The primary difference is that a household can be a single person living alone, whereas a family must be composed of at least two people. The family data that we have been discussing do not contain single persons living on their own. As a result, the family data contain about 80 million families, whereas the household data contain about 120 million households. The household distribution also has a problem: The number of persons per household varies widely among the five fifths. The number of households is the same in each fifth but the number of persons is not. In fact, the top fifth of households contains 72 percent more people than the lowest fifth. Thus income per person in the top fifth is only 8.6 times income per person in the bottom fifth. If we have to choose between the family data and the household data, the family income data is preferable because family size varies less among the quintiles.

**1.a.2. In-Kind Transfers** The census data overstate inequality because of what they do and do not measure. The census figures are for before-tax incomes, but isn't it the after-tax incomes that count? After all, much real income received by people is in non-monetary form and so is not counted at all. Particularly important are government in-kind transfers that add to people's incomes but are not counted as income. **In-kind transfers**, or noncash transfers, are services or products provided to certain sectors of society. For example, food stamps, Medicaid, and housing assistance are not counted as income. Even the Earned Income Tax Credit is not counted even though it is a cash transfer and contributed about \$380 billion in income in 2008.

#### **in-kind transfers**

The allocations of goods and services from one group in society to another.

**1.a.3. Size of Family or Household Units** The census data do not account for differences in the number of persons per family/household. Thus, as mentioned already, the distribution of income by families does not present a true picture because higher income families/households have more persons to support. There are about twice as many persons in the highest quintile group as in the lowest quintile.

**1.a.4. Consumer Expenditures** Income inequality might not be the best measure of how well off people are. People's standards of living are better evaluated by how much they consume, not their income. Many economists believe we would get a better picture of how rich or poor people are by looking at their consumption: what they have versus what they earn. The distribution of consumer expenditures is quite a bit more equal than is the distribution of income. According to the Bureau of Labor Statistics, the distribution of consumer expenditures had a HiLo ratio of 3.8 in 2008 in contrast to the income ratio of 11.97. The reason is that low-income households have substantially greater consumer expenditures than their income. In 2009, the poorest fifth consumed almost twice as much as their before-tax incomes.

<sup>2</sup> Edgar Browning, *Stealing from Each Other*, Westport, Conn.: Praeger, 2008, Chapter 2.





Incomes are unequally distributed in every nation. In developing countries, the distinction between rich and poor is greater than in the industrial nations, although the per capita income is significantly less in the developing countries. For instance, although the per capita income in Nigeria is only 7 percent of the per capita income in the United States, the wealthy in Lagos, Nigeria, live very well, with large houses, servants, expensive clothes, and other accoutrements of wealth. During the 1970s, many Nigerians became very wealthy as the price of oil surged and Nigerian oil production rose. Economic crisis and the collapse of oil prices since the late 1970s have led to a decline in Nigeria that has wiped out the gains of the previous 20 years.

### mobility

The extent to which people move from one income quintile to another over time.

**1.a.5. Mobility** When assessing the degree of inequality in a nation, it is important to know what happens over time. Do the poor stay poor and wealthy stay wealthy? When people see the history of the income shares, such as shown by the Gini coefficient of Figure 3, it seems to suggest that the rich got richer and the poor got poorer. These implications or suggestions are misleading because the same people are not in the same income quintiles over time. Economists use the term **mobility** to refer to the extent of movement within the income distribution over time. The lowest income quintile, for instance, tends to be largely the young and old. But as time passes, the young go from being in the lowest quintile to being in a higher quintile as they move into prime earning years, and new young move into the lowest quintile. In fact, of all workers in the lowest quintile in 2001, 32 percent had moved to a higher quintile just one year later. Similarly, those in peak earning years tend to be in the top quintile of income but drop into lower ones as they age and retire. Among those in the top quintile in 2001, 25 percent had fallen to a lower quintile one year later. The longer the time period considered, the greater the mobility. Of those in the lowest quintile in 2001, two-thirds were in a higher quintile in 2007. Of those in the highest quintile in 2001, 61 percent were in a lower quintile in 2007.<sup>3</sup> About 55 percent of taxpayers move to a different income quintile within 10 years.

**1.a.6. Income Distribution in Other Nations** Income is much more equally distributed in industrial nations than it is in developing countries. In developing countries, the richest 20 percent of the population have more than 50 percent of total household income while the poorest 20 percent have less than 4 percent. Interestingly, the income distribution in the former and current communist countries of Russia and China is more

<sup>3</sup> <http://blog.american.com/?p=29147>.

unequal than that in the United States. Although the inequality of incomes within a nation compares the relative status of residents in that nation, it does not tell us anything about their absolute levels. It tells us very little about the quality of life of the people in different nations. Per capita income in the United States exceeds \$47,000, whereas in China it is near \$6,000, and in Cameroon it is about \$400.

## 1.b. Measuring Poverty

Defining poverty is difficult. We can, without too much trouble, say which groups have higher or lower income levels and how incomes are distributed in a society, but this does not provide much information about a person's quality of life. All the income inequality measures can tell us is what one's income is relative to that of others; they are relative measures. Per capita income—income per person—is an absolute measure. It doesn't compare incomes, but simply states the level. Per capita income does not indicate how people feel about their income status or whether they enjoy good health and a decent standard of living. Those who are comfortable in one country could be impoverished in another. The poverty level in the United States would represent a substantial increase in living standards for people in many other nations. Yet members of a poor family in the United States would probably not feel less poor if they knew that their income level exceeded the median income in other countries.

**1.b.1. What Is Income?** In the United States, data related to poverty are collected and published annually by the Department of Health and Human Services. Table 2 lists



**2** How is poverty measured, and does poverty exist in the United States?

**TABLE 2** Average Income Poverty Cutoffs for a Nonfarm Family of Four in the United States, 1959–2010

| Year | Poverty Level | Year        | Poverty Level   |
|------|---------------|-------------|-----------------|
| 1959 | \$ 2,973      | 1990        | \$ 13,359       |
| 1960 | \$ 3,022      | 1991        | \$ 13,924       |
| 1966 | \$ 3,317      | 1992        | \$ 13,950       |
| 1969 | \$ 3,743      | 1993        | \$ 14,764       |
| 1970 | \$ 3,968      | 1994        | \$ 15,200       |
| 1975 | \$ 5,500      | 1995        | \$ 15,600       |
| 1976 | \$ 5,815      | 1996        | \$ 16,036       |
| 1977 | \$ 6,191      | 1997        | \$ 16,400       |
| 1978 | \$ 6,662      | 1998        | \$ 16,660       |
| 1979 | \$ 7,412      | 1999        | \$ 16,895       |
| 1980 | \$ 8,414      | 2000        | \$ 17,463       |
| 1981 | \$ 9,287      | 2001        | \$ 17,463       |
| 1982 | \$ 9,862      | 2002        | \$ 18,244       |
| 1983 | \$10,178      | 2003        | \$ 18,900       |
| 1984 | \$10,609      | 2004        | \$ 19,424       |
| 1985 | \$10,989      | 2005        | \$ 19,874       |
| 1986 | \$11,203      | 2006        | \$ 20,516       |
| 1987 | \$11,611      | 2007        | \$ 21,100       |
| 1988 | \$12,090      | 2008        | \$ 21,834       |
| 1989 | \$12,675      | 2009        | \$ 22,050       |
|      |               | <b>2010</b> | <b>\$22,162</b> |

Source: [www.census.gov/hhes/www/poverty.html](http://www.census.gov/hhes/www/poverty.html).

the poverty thresholds of income for a nonfarm family of four since 1959. Families with incomes above the cutoffs would be above the poverty level, in the eyes of the federal government. These cutoffs are arbitrary numbers selected by the government to provide an indication of how many people are in poverty.

Where does the poverty income threshold come from? A 1955 study found that the average family in the United States spent about one-third of its income on food, so when the government decided to begin measuring poverty in the 1960s, it calculated the cost to purchase meals that met a predetermined nutritional standard for a year and multiplied that cost by 3. That is where it drew the poverty line. Since then, the official poverty-line income has been adjusted for inflation each year.

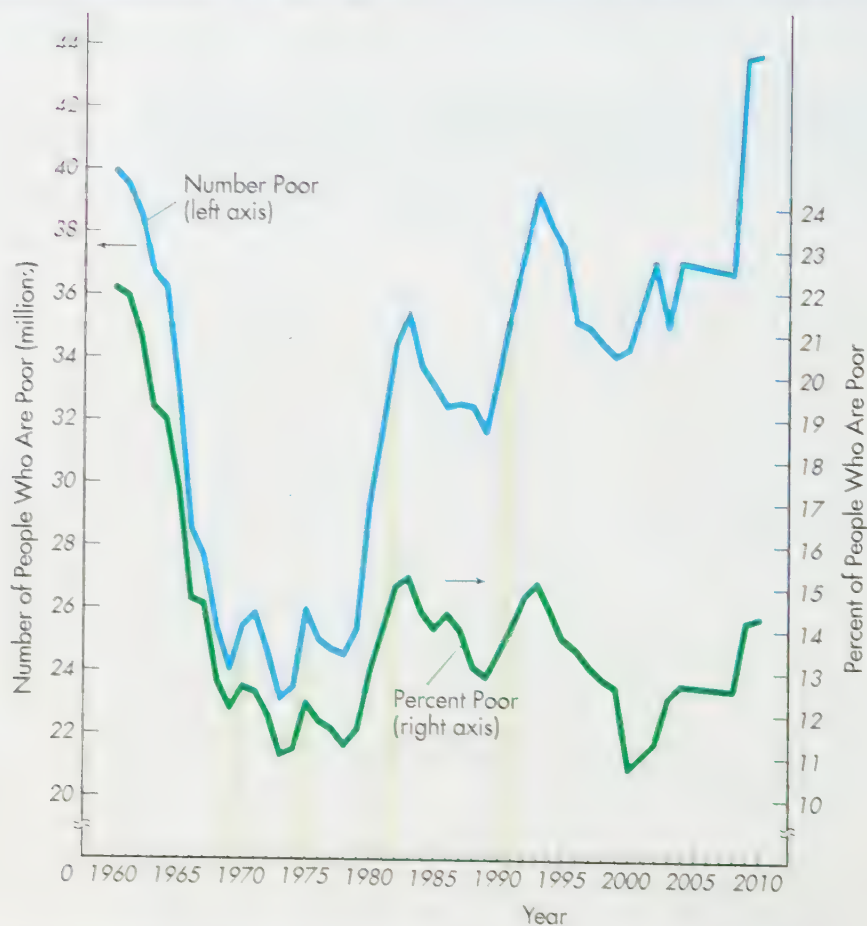
#### cash transfers

Money allocated away from one group in society to another

The poverty thresholds count earnings from cash transfers (except earned income tax credit) but not in-kind transfers. **Cash transfers** are unearned funds given to certain sectors of the population. They include some Social Security benefits and disability pensions, as well as unemployment compensation to those who are temporarily out of work.

How many Americans fall below the poverty line? Figure 4 compares the number of people living in poverty and the percentage of the total population living in poverty (the incidence of poverty) for each year.

**FIGURE 4** The Trends of Poverty Incidence



The number of people classified as living in poverty is measured on the left vertical axis. The percentage of the population classified as living in poverty is measured on the right vertical axis.

Sources: [www.census.gov/hhes/www/poverty.html](http://www.census.gov/hhes/www/poverty.html); <http://aspe.hhs.gov/POVERTY/09poverty.shtml>.



There are many controversies over how poverty should be measured. Some argue that the poverty rate is really not nearly as high as Figure 4 indicates—that government transfers and other programs are not properly taken into account. Also, the poverty measure makes no distinction between the needs of a 3-month-old and those of a 14-year-old or between a rural family in a cold climate and an urban family in the subtropics. It draws no distinction between income and purchasing power. A welfare mom living on \$400 a month is treated in a manner identical to that of a graduate student who earns \$400 a month at a part-time job and borrows an additional \$1,500 from her parents. Nor does it consider the problem of income from the underground economy—the income that is not reported or measured in income statistics.

## RECAP

1. The Lorenz curve shows the degree to which incomes are distributed equally in a society. The more the Lorenz curve bows out, the more unequal is the income distribution.
2. The Gini coefficient is a measure of the degree to which the Lorenz curve bows down away from the line of income equality. The higher the Gini coefficient, the greater the income inequality.
3. The HiLo ratio is the ratio of the average income of the top quintile divided by the average income of the bottom quintile.
4. Income inequality measured on the basis of before-tax income is considerably reduced by adjusting for taxes and transfers as well as the number of people in the family or household, and by relying on expenditures rather than income.
5. Inequality is a measure of relative status in a country. It does not tell us the absolute level of income or consumption nor the standard of living.
6. The income level selected as the poverty threshold is arbitrary, based on an attempt to measure the income people would need to purchase three meals of a certain nutritious value.
7. The incidence of poverty is the percentage of the population whose income falls below the poverty threshold.

## 2. The Poor

A higher percentage of women fall into poverty than do men; a higher percentage of African Americans and Hispanics fall into poverty than do others; a higher percentage of those without high school education fall into poverty than do those with high school educations.



### 3 Who are the poor?

*The health of the economy is a primary determinant of the incidence of poverty.*

### 2.a. Temporary and Permanent Poverty

If those who are poor at any one time are poor only temporarily, then their plight is only temporary. If people in poverty are able to improve their situation even while others slip into poverty temporarily, the problem of poverty for society is not as serious as it is if poverty is a permanent condition once a person has fallen into it. Approximately 25 percent of all Americans fall below the poverty line at some time in their lives. Many of these spells of poverty are relatively short; nearly 45 percent last less than a year.

**2.a.1. The Economy and Poverty** The major factor accounting for the incidence of poverty is the health of the economy. People are generally made better off by economic growth. Economic stagnation and recession throw the relatively poor out of their jobs



### 4 What are the determinants of poverty?

and into poverty. Economic growth increases the number of jobs and draws people out of poverty and into the mainstream of economic progress. Recessions increase poverty and economic booms reduce poverty.

The recession of 1969–1970 was relatively mild. Between 1969 and 1971, the unemployment rate rose from 3.4 to 5.8 percent, and the total number of people unemployed rose from 2,832,000 to 5,016,000. This recession halted the decline in poverty rates for two years. When the economy once again began to expand, the poverty rates dropped. The 1974 recession brought on another bout of unemployment that threw people into poverty. This recession was relatively serious, causing the unemployment rate to rise to 8.3 percent by 1975 and the number of unemployed to rise to 7,929,000. Once again, however, the poverty rate declined as the economy picked up after 1975. The recession of 1980–1982 threw the economy off track again. In 1979, the total number of people unemployed was 6,137,000; by 1982, 10,717,000 were without jobs. As the economy came out of this recession, the poverty rate began to decline, and it continued to decline as the economy grew throughout the 1980s. The poverty rate then rose as the economy fell into recession in 1990 and struggled into 1992. The poverty rate of 14.2 percent in 1991 was the highest level in nearly three decades; the number of people living in poverty grew to 35.7 million. Somewhat surprisingly, the number of people in poverty and the incidence of poverty both grew in 1993 and 1994, years of economic growth. Throughout the rest of the 1990s, however, both the poverty rate and the number of people in poverty declined. As the economy again entered a recession in 2000, the number of people in poverty began to rise. But as the economy grew following 2001, the number in poverty fell. The 2008–2010 recession saw the number of poor rise to 43.5 million and the percent of poor rise to 14.2 percent. This compares to about 38 million and 13 percent in 2008.

*The primary characteristic of those who fall below the poverty line is the lack of a job.*

*The less education a person has, the greater his or her chance of experiencing poverty.*

Common sense says that the primary reason people might have no or little income is that they don't have jobs or don't have jobs that pay well. Why don't people have jobs or good jobs? The primary reason is that their skills and education don't offer value to employers. People who do not have a high school education are many more times likely to have an income at the poverty level than people with a high school diploma. And a technical school or college degree offers even more likelihood that one won't fall into poverty. Because it is primarily the very young who don't have skills or education, they are the primary population group with poverty-level incomes. In 2010, 21 percent of the U.S. population under the age of 18 had incomes below the poverty threshold, whereas less than 14 percent of the rest of the population had poverty-level incomes.

African Americans and Hispanics carry a much heavier burden of poverty relative to the size of their populations than do whites. Families headed by a female are much more likely to be in poverty than families headed by a male. Why? At least part of the answer is skills and education: White males have higher levels of education than do African American or Hispanic males or females of all ethnic groups.

A significant percentage of those in poverty have less than eight years of education. Fully 22 percent of the people with less than eight years of education fall below the poverty level of income. Less than 4 percent of those with a college degree fell below the poverty cutoff.<sup>4</sup> Lack of education prevents people from securing well-paying jobs. Without the human capital obtained from education or training programs, finding a job that is stable and will not disappear during a recession is very difficult. Even someone who has the desire to work but has no exceptional abilities and has not acquired the skills necessary for a well-paying job is unlikely to escape poverty completely. Minorities, women, the young, and the disabled have disproportionately less education than the rest of the population, and as a result have a higher likelihood of falling into poverty.

<sup>4</sup> <http://www.census.gov/hhes/www/macro/032008/pov/toc.htm>.

## RECAP

1. Many people experience poverty only temporarily. Nearly 45 percent of the spells of poverty last less than a year.
2. The health of the economy is a primary determinant of the incidence of poverty.
3. The incidence of poverty is much higher among African Americans and Hispanics than it is among whites, and higher among females than males.

## 3. Government Antipoverty Policies

### 3.a. Tax Policy

If people are provided with enough income to bring them above the poverty level, the number of people in poverty will be reduced. Funds used to supplement the incomes of the poor must come from somewhere. Many societies adopt a Robin Hood approach, taxing the rich to give to the poor.

A **progressive tax** is a tax that rises as income rises—the marginal tax rate increases as income increases. If someone with an annual income of \$20,000 pays \$5,000 in taxes while someone else with an annual income of \$40,000 pays \$12,000 in taxes, the tax is progressive. The first person is paying a 25 percent rate, and the second is paying a 30 percent rate.

A **proportional tax** is a tax whose rate does not change as the tax base changes. The rate of a proportional income tax remains the same at every level of income. If the tax rate is 20 percent, then all individuals pay 20 percent, whether they earn \$10,000 or \$100,000.

A **regressive tax** is one whose rate decreases as the tax base increases. The Social Security tax is regressive; a specified rate is paid on income up to a specified level, but no Social Security taxes are paid on income beyond that level. In 2009, the cutoff level of income was \$106,000 and the tax rate was 6.2 percent. A person earning \$300,000 paid no more in Social Security taxes than someone earning \$106,000, and therefore had a lower Social Security tax rate.

*There are two general approaches the government uses to provide benefits to the poor: tax policies and welfare programs.*

#### **progressive tax**

A tax whose rate increases as income increases.

#### **proportional tax**

A tax whose rate does not change as the tax base changes.

#### **regressive tax**

A tax whose rate decreases as the tax base increases.

### 3.b. Welfare Programs

The U.S. welfare program consists of Temporary Assistance for Needy Families (TANF), formerly known as Aid to Families with Dependent Children (AFDC). The Green Book provided by the U.S. House of Representatives identifies 85 separate programs that provide cash and noncash aid that is directed primarily to persons with limited income. These programs, together with Social Security, Medicare, and public schools, constitute the welfare system in the United States.<sup>5</sup> According to the government's own accounting, there are 85 welfare programs on which expenditures were \$620 billion. Of this, about 70 percent was financed by the federal government.

Since about 37 million people were considered to be in poverty and expenditures were \$620 billion, over \$16,750 was spent on each person in poverty. This

<sup>5</sup> The House Ways and Means Committee Green Book provides program descriptions and historical data on a wide variety of social and economic topics, including social security, employment, earnings, welfare, child support, health insurance, the elderly, families with children, poverty, and taxation. It has become a standard reference work for those interested in the direction of social policy in the United States. It is compiled by the staff of the Committee on Ways and Means of the U.S. House of Representatives. GPO Access contains the Green Book for 1996, 1998, 2000, and 2004.



means that for a family of three persons, welfare expenditures were over \$50,000, well above the poverty threshold. How can so much be spent and still have 37 million people in poverty? Some of the money covers administrative costs. Some of the money goes to poor persons who are not in poverty. More importantly, some of the money is used to provide benefits that are not counted as income when the government counts the poor.

The main transfer programs are social insurance, cash welfare or public assistance, in-kind transfers, and employment programs. Social Security—officially known as Old-Age, Survivors, and Disability Insurance (OASDI) and listed as FICA on paycheck stubs—is the largest social insurance program. Coverage is nearly universal, so the total amount of money involved is immense—more than \$200 billion annually. Two-thirds of the aged rely on Social Security for more than half of their income.

Unemployment insurance provides temporary benefits to regularly employed people who become temporarily unemployed. Funded by a national tax on payrolls levied on firms with eight or more workers, the system is run by state governments. Benefits normally amount to about 50 percent of a worker's usual wage.

Supplemental security income (SSI) ranks first among cash welfare programs. Most of the SSI population is blind or otherwise disabled (65 percent), and the rest are over age 65. Unlike Social Security recipients, who are *entitled* to receive benefits because they are a certain age or otherwise qualify, recipients of SSI must meet certain disability requirements or be of a certain age and must have incomes below about \$4,500 per year.

About 60 percent of all poor households receive in-kind transfers. The largest of these programs is Medicaid (for a discussion of Medicaid and the medical care industry, see the chapter “Aging, Social Security, and Health Care”). Medicaid provides federal funds to states to help them cover the costs of long-term medical and nursing home care. Second in magnitude is the food stamp program, which gives households coupons that are redeemable at grocery stores. The amounts vary with income and household size. Other programs include jobs and training directed toward disadvantaged workers and the Head Start program, an education program available to poor children. Total government outlays for social service (welfare) programs run more than \$700 billion annually.

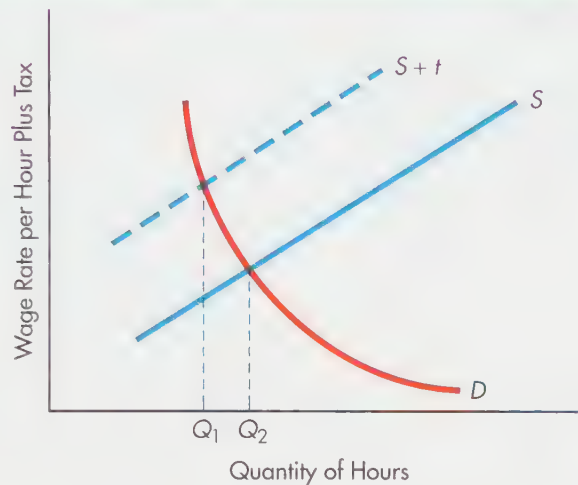


**5** Do government programs intended to reduce poverty benefit the poor?

### 3.c. The Effectiveness of Welfare Programs

In 1964, President Lyndon Johnson declared “unconditional war on poverty.” In 1967, total transfers were about \$10 billion. Now they run nearly \$1 trillion. Is the war being won? Unfortunately, there is no easy or straightforward answer to that question. In fact, there is disagreement about whether antipoverty programs have reduced or increased poverty. Some people maintain that without these programs, income inequality and poverty would have been much more severe. Others argue that welfare has been a drag on the economy and may have made poverty and inequality worse than they otherwise would have been. It is impossible to compare what did happen with what would have happened in the absence of the government's programs. All economists can do is look at the incentives created by the programs and observe what actually occurred.

**3.c.1. Incentives and Government Income Transfer Programs** Taxes are one method of collecting revenues with which antipoverty or welfare programs can be paid for. Taxes affect those who pay the taxes; they may lead to less labor being supplied. As we discussed in the chapter “The Labor Market,” the supply of labor comes from the decisions that individuals make regarding the number of hours of work they are willing and able to perform at each wage. The individual trades off labor and leisure, essentially buying leisure time—giving up the income gained by working. Thus, when the cost of

**FIGURE 5** Taxes and Jobs

If a tax is imposed on the worker, the individual will choose to supply less labor at each wage rate. The supply curve shifts in, and the number of hours worked decreases.

leisure to an individual is decreased, individuals will buy more leisure; that is, they will work less. A tax increases the cost of working or, conversely, decreases the cost of leisure. It should be expected that people will choose the now less expensive leisure time over the now more costly work time when taxes increase. This will affect the cost of labor to firms. In Figure 5, suppose the equilibrium in the labor market prior to a tax on labor is  $Q_2$ . Now, suppose a tax of rate  $t$  is imposed on each dollar of income. As a result of the tax, the worker decides to supply less labor at every wage rate, shown as an inward shift of supply, to  $S + t$ . The number of hours worked declines to  $Q_1$ . The tax has led to fewer hours worked and thus less income earned.

When funds are distributed to the unemployed or to those who are employed at low-paying jobs, it affects the incentives of these individuals to work. When a low-income individual receives a transfer payment, that individual has less of an incentive to forgo leisure time for work time. This raises the question about whether welfare leads to a permanent dependency on welfare and an unwillingness to work.

**3.c.2. Disincentives Created by the Welfare System** Those who argue that welfare programs are a drag on the economy and may make poverty and income inequality worse typically focus on the disincentives created by the transfers. Incentives to work hard and increase productivity may be reduced for both the rich and the poor by programs that take from the rich and give to the poor. Those who are paying taxes may ask themselves, “Why should I work an extra hour every day if all the extra income does is pay additional taxes?” Someone who gets to keep only 60 cents of the next dollar earned has less incentive to earn that dollar than someone who gets to keep it all.

In addition, those who receive benefits may lose the incentive to change their status. Why should someone take a job paying \$6,000 per year when he or she can remain unemployed and receive \$8,000? Someone who is out of work might wonder, “Why should I spend eight hours a day in miserable working conditions when I can relax every day and bring home nearly the same amount of income?” If incentives to work are weak, then the total income created in the economy is less than it otherwise would be. Less income and lower economic growth mean more people in poverty.

Antipoverty programs must pay special attention to the incentives they create. Everything else the same, a program causing fewer distortions is better than a program creating more distortions.

### 3.d. The Negative Income Tax and Family Allowance Plans

#### negative income tax (NIT)

A tax system that transfers increasing amounts of income to households earning incomes below some specified level as their income declines.

The solution to the welfare system problems most often proposed by economists is the **negative income tax (NIT)**—a tax system that transfers increasing amounts of income to households earning incomes below some specified level. The lower the income, the more that is transferred. As income rises above the specified level, a tax is applied. Economists like the NIT because, at least in theory, it reduces poverty without causing too many distortions in the economy.

The NIT would work like this. Suppose policymakers determine that a family of four is to be guaranteed an income of \$10,000. If the family earns nothing, then it will get a transfer of \$10,000. If the family earns some income, it will receive \$10,000 less a tax on the earned income. If the tax rate is 50 percent, then for each dollar earned, \$.50 will be taken out of the \$10,000 transfer.

With a 50 percent tax rate, there would be some incentive to work because each additional dollar of earnings would bring the recipient of the transfer \$.50 in additional income. At some income level, the tax taken would be equal to the transfer of \$10,000. This level of income is referred to as the *break-even income level*. In the case of a \$10,000 guaranteed income and a 50 percent tax rate, the break-even income level is \$20,000. Once a family of four earns more than \$20,000, its taxes exceed the transfer of \$10,000.

The break-even level of income is determined by the income floor and the tax rate:

$$\text{Break-even income level} = \frac{\text{income floor}}{\text{negative income tax rate}}$$

If the guaranteed income floor is \$13,000 and the tax rate is 50 percent, then the break-even income level would be \$26,000. If the guaranteed income floor is \$13,000 but the tax rate is 33 percent, then the break-even income level would be \$39,000.

For the negative income tax to eradicate poverty, the guaranteed level of income has to be equal to the poverty threshold. But if the tax rate is less than 100 percent, the break-even income level will be above the poverty level, and families who are not officially considered “poor” will also receive benefits. At a guaranteed income level of \$19,874 and a 33 percent tax rate, the break-even income level is \$60,224. All families of four earning less than \$60,224 would receive some income benefits.

For people who are now covered by welfare programs, the negative income tax would increase the incentive to work, and that is what proponents of the negative income tax like. However, for people who are too well off to receive welfare but who would become eligible for NIT payments, the negative income tax might create work disincentives. It would provide these families with more income, and they might choose to buy more leisure.

The possibility of disincentive effects has worried both social reformers and legislators, so in the late 1960s the government carried out a number of experiments to estimate the effect of the negative income tax on the supply of labor. Families from a number of U.S. cities were offered negative income tax payments in return for allowing social scientists to monitor their behavior. A matched set of families who were not given NIT payments was also observed. The idea was to compare the behavior of the families receiving NIT payments with that of the families who did not receive them. The experiments lasted about a decade and showed pretty clearly that the net effects of the negative income tax on labor supply were quite small.



Even though disincentive effects did not seem to occur to any great extent, the negative income tax has not gained political acceptability. One reason is the high break-even income level. Politicians are not very supportive of programs that may provide income transfers to a family earning significantly more than the poverty income level. Another reason is the transfer of dollars rather than in-kind benefits (food and medical care). Policymakers do not look favorably on the idea of giving a family cash that it can use as it pleases, even though it would make economic sense to do so.

While politicians focus on poverty and government expenditures on programs and support for the poor rise, the poor remain. In a market system, there will always be some people with higher incomes and others with lower incomes. So if those with low incomes are considered poor, there will always be people who are poor in a market economy. Eliminating the difference affects incentives to work, innovate, take risks, acquire education, and so on. Is there an optimal level of income inequality, and can programs be used to minimize some of the negative effects of low income without negatively affecting incentives? These are questions economists attempt to answer. One of the findings with which economists generally agree is that economic growth is a necessary component for reducing poverty. So economists must determine what leads to economic growth. We will discuss this briefly in the next section.

## RECAP

1. Government policies designed to change the distribution of income to one that is more equal involve taking from the rich and giving to the poor—a Robin Hood approach.
2. A tax may be progressive, proportional, or regressive. A progressive tax is one with a marginal tax rate that increases as income rises. A proportional tax is one that rises as income rises, but with the marginal tax rate remaining constant. A regressive tax is one whose marginal tax rate decreases as income increases.
3. Transfer mechanisms include Social Security, welfare, and unemployment programs.
4. The incentives created by transfer programs may make the problem of poverty worse rather than better.
5. The negative income tax is a proposal to provide transfers, but in a way that minimizes disincentives.

## 4. Income Distribution among Nations

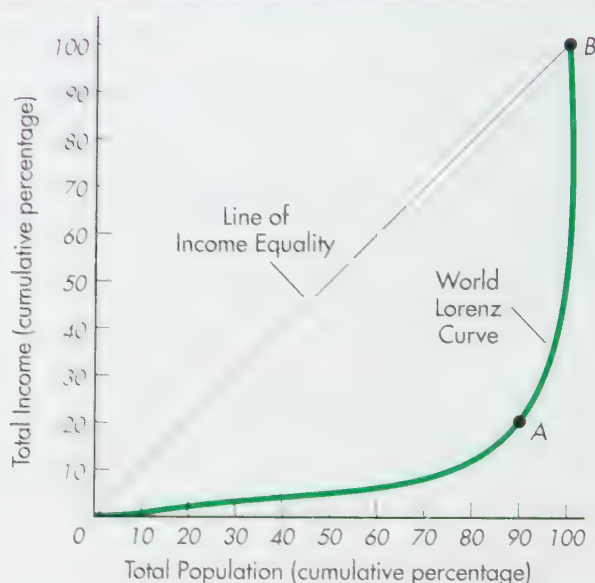
Incomes differ greatly from one nation to another as well as within nations. There are “haves” and “have-nots” throughout the world—the lowest 90 percent of the population in terms of income has less than 20 percent of the total world income, shown as point *A* in Figure 6. The richest 10 percent of the world’s population has more than 80 percent of total world income, the difference between *A* and *B*.

### 4.a. World Income Distribution

There is a huge gap in income and wealth between the “haves” and “have-nots” in the world. About 80 percent of the world’s population lives in what countries in North America and Europe consider to be poverty. The poorest 10 percent of Americans are better off than two-thirds of the world’s population. (The Global Business Insight



- 6** Why are incomes unequally distributed among nations?

**FIGURE 6** World Lorenz Curve

The Lorenz curve is typically used to illustrate the income distribution within countries. In this figure, a Lorenz curve is drawn to compare how world income is distributed across countries. The bottom 90 percent of the world's population, residing in the less-developed countries, accounts for 20 percent of the world's income, shown as point A. The richest 10 percent of the population, residing in the developed countries, accounts for 80 percent of total income, shown as point B.

*Source:* Data are from *World Development Report*, 1999 and 2000.

“Economic Development and Happiness” suggests that the feeling of well-being of a population depends on the level of per capita income and also on freedom.)

Why are some nations rich and others poor? If two countries were equal today, but one's economy was growing faster than the other's, would the two remain equal? Suppose one nation was growing at a rate of 4 percent per year and another nation was growing at a rate of 2 percent per year. How long would it take each of the two countries to double its income? Using the rule of 72, where dividing the growth rate into 72 yields the number of time periods until the item that is growing doubles, we find that an economy with a 4 percent growth rate doubles every 18 years, whereas one with a 2 percent growth rate doubles every 36 years. Thus, if all nations started out with the same level of income and some grew faster than others, it would not take long before the incomes of different nations were widely unequal.

The answer to why nations have different levels of income is that their economies have grown at different rates. Why have their economies grown at different rates? One reason is that economic growth depends on economic and political systems—the freer the economic and political system, the greater is the rate of economic growth.

#### 4.b. Foreign Aid

How should the unequal distribution among nations that exists today be dealt with? One approach is welfare—transferring income from the rich countries to the poor countries. Another is to try to increase the growth rates of the poor countries. *Foreign aid* is

# GLOBAL BUSINESS INSIGHT



## Economic Development and Happiness

A nation's standard of living influences the attitudes of the nation's population toward life in general, although it is not the only factor. Using subjective measures of happiness or satisfaction with life, researchers find that year after year, the Danes, Swiss, Irish, and Dutch feel happier and more satisfied with life than do the French, Greeks, Italians, and Germans. Whether they are German-, French-, or Italian-speaking, the Swiss rank very high in life satisfaction—much higher than their German, French, and Italian neighbors. People in the Scandinavian countries generally are both prosperous and happy. However, the link between national affluence and well-being isn't consistent. Although the developed nations all had higher per capita incomes than the Mexicans, the Mexicans had a higher satisfaction with life than the populations of many of the developed nations. The overall pattern does show

that wealthier nations tend to have higher levels of life satisfaction than poorer ones, but income and wealth are not the only factors influencing happiness.

Related to wealth is the type of government under which citizens live. The most prosperous nations have enjoyed stable democratic governments, and there is a link between a history of stable democracy and national well-being. The 13 nations that have maintained democratic institutions continuously since 1920 all enjoy higher life satisfaction levels than do the 11 nations whose democracies developed after World War II.

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**Source:** Bruno Frey and Alois Stutzer, *Happiness and Economics* (Princeton, NJ: Princeton University Press, 2002).

the name given to programs that transfer income from rich nations to poor nations. The questions about foreign aid include all the questions regarding welfare within the United States: What are the effects on incentives for recipients and for donors, and how much of the aid reaches those who are needy? But foreign aid also involves issues such as whether the aid will spur economic growth. It is possible that the aid will actually hinder growth, because it creates the wrong incentives.

Another approach to the inequality issue that creates positive incentives for economic growth lies in private property rights and title to property. Hernando de Soto, a Peruvian economist, has received a lot of publicity with his study of developing nations. He has suggested that if the institutions of private property in the poorer nations were comparable to those in the industrial nations, rapid economic growth would take place. Poor countries have to reform their political and legal systems to allow poor people to establish clear title to assets, so they can more easily borrow money against those assets. In Mexico, for instance, the assets for which there are no legal property rights include over 11 million houses, 137 million hectares of land (338.4 million acres), and 6 million unregistered micro-, small-, and medium-sized businesses. About 78 percent of the population of Mexico is involved in that side of the economy. These assets are worth about \$315 billion, which is equivalent to 31 times all foreign direct investment in Mexico for all time. No one has title to this property. Thus no one can get a loan using the property as collateral, and no one has the right to sell the property.

Even when legal title is established, it is often difficult to use that title because of the failure of countries to enforce people's ownership of property. In poor nations, the legal system exists for a privileged elite, but it is cumbersome and costly for most of the population. For example, creating a mortgage in Mexico takes a buyer 24 months, working eight hours a day. Foreclosing on a mortgage takes 43 months. Selling a house, if you're among the 78 percent of Mexicans who are poor and you want to do it legally, takes



24 months working eight hours a day. Obtaining legal access for a business—that is to say, setting up a limited liability corporation, or whatever other form allows you to have shareholders—takes 17 months working eight hours a day and 126 contacts with government.

The creation and enforcement of private property rights is a necessary prelude to the functioning of markets, and an economy without markets does not grow very rapidly. Markets do not work when there are no private property rights or when private property rights are not widely available and enforced. As we'll discover in the next chapter, other approaches to enhancing economic growth have been tried. But these policies as a whole have not worked. Poor nations that have not established private property rights remain poor.

## RECAP

1. Income is not distributed equally within individual nations, and different nations do not have the same income.
2. The poor nations are poor at least partly because of their lack of provision and enforcement of private property rights.
3. One approach used to improve the conditions of people in poor nations is foreign aid—a transfer of income from rich nations to poor nations.
4. The incentives created by foreign aid are analogous to the incentives created by welfare systems and so might not be conducive to economic growth.
5. An approach to stimulate economic growth is to provide the population of a country, particularly its poor, with the legal means to establish and maintain private property.

## SUMMARY

1. Are incomes distributed equally in the United States?
  - The Lorenz curve, the Gini coefficient, and the HiLo ratio provide measures of the degree of income inequality. §1.a
  - If the Lorenz curve corresponds with the line of income equality, then incomes are distributed equally. If the Lorenz curve bows down below the line of income equality, then income is distributed in such a way that more people earn low incomes than earn high incomes. §1.a
  - The Gini coefficient is a measure of the area between the Lorenz curve and the line of equality. The higher the Gini coefficient, the greater is income inequality. §1.a
  - The HiLo ratio is the ratio of the share of income earned by the top quintile of families to the share of income earned by the bottom quintile of families. §1.a
2. How is poverty measured, and does poverty exist in the United States?
  - The poverty threshold is based on a 1955 study of how much the average family in the United States spent on food. §1.b
  - The income counted in the calculation of poverty statistics is resource earnings and cash transfers. §1.b.1
3. Who are the poor?
  - Many people fall below the poverty line for a short time only. §2.a
  - The incidence of poverty decreases as the economy grows and increases as the economy falls into recession. §2.a.1
4. What are the determinants of poverty?
  - A lack of education and thus a lack of a full-time or well-paying job, as well as the health of the economy, are the primary determinants of poverty. §2.a.1

### 5. Do government programs intended to reduce poverty benefit the poor?

- Tax policies that are progressive can reduce the incentives to acquire more income. §3.c.1, 3.c.2
- Government programs can reduce individuals' incentives to climb out of poverty. §3.c.2

### 6. Why are incomes unequally distributed among nations?

- As a rule, incomes are distributed more unequally in developing countries than in developed countries. §4

- A fundamental reason that standards of living differ among nations is the different growth rates that the economies of these nations have experienced over time. §4.a
- Free markets and political freedom lead to economic growth. §4.a
- The creation and enforcement of private property rights is a necessity if a nation's economy is to grow. §4.b

## KEY TERMS

cash transfers, 416  
Gini coefficient, 411  
in-kind transfers, 413

Lorenz curve, 410  
mobility, 414  
negative income tax (NIT), 422

progressive tax, 419  
proportional tax, 419  
regressive tax, 419

## EXERCISES

1. What is a Lorenz curve? What would the curve look like if income were equally distributed? Could the curve ever bow upward above the line of income equality?
2. Why does the health of the economy affect the number of people living in poverty?
3. What would it mean if the poverty income threshold level of the United States were applied to Mexico?
4. What positive arguments can be made for reducing income inequality? What normative arguments are made for reducing income inequality?
5. If one country is growing at a rate of 3 percent per year and another at a rate of 8 percent per year, how long will it take for each to double? What factors might account for the rate at which nations' standards of living grow?
6. Are people who are poor today in the United States likely to be poor for the rest of their lives? Under what conditions is generational poverty likely to exist?

7. Use the following information to plot a Lorenz curve.

| Percent of Population | Percent of Income |
|-----------------------|-------------------|
| 20                    | 5                 |
| 40                    | 15                |
| 60                    | 35                |
| 80                    | 65                |
| 100                   | 100               |

8. If the incidence of poverty decreases during periods when the economy is growing and increases during periods when the economy is in recession, what policies might be used to reduce poverty most effectively?
9. If the arguments for reducing income inequality and poverty are normative, why rely on the government to reduce the inequality? Why doesn't the private market resolve the problem?
10. How could transfer programs (welfare programs) actually increase the number of people in poverty?

11. What is the difference between in-kind and cash transfers? Which might increase the utility of the recipients the most? Why is there political resistance to the negative income tax?
  12. The Gini coefficient for a nation indicates the degree of income inequality within that nation; the Gini coefficient among nations indicates the degree of income inequality among nations. Would you ever expect to see the following scenarios?
    - a. A case in which the Gini coefficient for a nation is smaller than the average of the Gini coefficients for all nations
    - b. A case in which the Gini coefficient for income distribution among nations is larger than the average of all nations' Gini coefficients
    - c. A case in which the Gini coefficient is zero
  13. Consider the following three solutions offered to get rid of homelessness and discuss whether any of them would solve the problem.
    - a. Provide permanent housing for all who are homeless.
    - b. Provide free hospital care for the one-third of the homeless who are mentally ill.
    - c. Provide subsidies for the homeless to purchase homes.
  14. What is the relationship between the Gini coefficient and the Lorenz curve? Illustrate your answer using exercise 7.
  15. Why would Hernando de Soto's suggestions, if implemented, stimulate economic growth?
  16. Why do countries need a system of well-defined and enforced private property rights to succeed and grow?
  17. Explain how foreign aid and welfare programs create disincentives to work, produce, and generally improve economic conditions.
- You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).



## AMERICAN GAINS IN EDUCATIONAL ATTAINMENT ARE SLOWING

*Economic Report of the President, 2011*

**T**he rapid technological changes of the 20th century not only enhanced productivity and created new industries but also increased demand for skilled labor (Goldin and Katz 2007). Higher education is the key to many modern occupations, and over the years Americans have correspondingly raised their educational attainment, with average years of schooling at age 30 rising 6.2 years between 1900 and 2000. But American gains in educational attainment are slowing. Average schooling duration in the final quarter of the 20th century increased at only about one-third of its previous pace.

Compared with other countries, American educational attainment also appears to be falling behind.

While growth in educational attainment has slowed, the demand for skilled workers continues to increase. According to the Bureau of Labor Statistics, 14 of the 30 fastest-growing occupations in the United States require at least a bachelor's degree, with 7 others requiring either an associate's degree or a postsecondary vocational certificate or award. Moreover, over the past 30 years, the return to a college education has also risen, further suggesting that increasing demand for high-skilled workers is outstripping their supply. . . . In 2009, workers

with a bachelor's degree or more earned more than twice as much as those with only a high school diploma, while those with some college or an associate's degree earned 25 percent more. These wage premiums have risen 72 percentage points and 10 percentage points, respectively, since 1963. Although not shown in the figure, the returns to postgraduate education have risen even more steeply. In the mid-1960s, those with postgraduate degrees earned about 50 percent more than high school graduates; by 2009, this wage premium had more than tripled to 159 percent.

While earnings of workers who have attended college have risen, the annual income of those with only a high school degree or less has fallen since the 1970s, even before the declines during the recent recession. High school dropouts have fared the worst among all workers, with earnings falling 12 percent, in real terms, since 1963. These workers currently earn 30 percent less than high school graduates. This trend mirrors a broader pattern of rising wage and income inequality in the United States, with gains from economic growth concentrated in some segments of the population. In the past 20 years, real income for the top 20 percent of all households has grown by 20 percent, while incomes for households in the bottom half of the

distribution have been essentially flat. By contrast, in other periods of economic growth, such as that from World War II to the mid-1970s, advances in labor income were spread roughly evenly throughout the wage distribution. A leading hypothesis about the causes of rising income inequality over the past 30 years points to technological advances that have increased the demand for high-skilled workers, while the supply of these workers has not accelerated to meet the demand.

Further, the overall data on educational attainment mask large disparities by race and socioeconomic status. Whereas 49 percent of non-Hispanic whites aged 25 to 34 hold a postsecondary degree, only 29 percent of African Americans and 19 percent of Hispanics do. In addition, children from high income households are almost four times as likely to obtain a postsecondary degree by age 24 as those from low-income families. Finally, achievement lags in science, technology, engineering, and mathematics (StEM) fields, all areas that show high wage returns to training and underpin future innovation. Recent test results in primary and secondary education suggest that American schoolchildren are lagging behind in math and science. The 2009 Programme for International Student Assessment survey, for example, showed that American

students placed 17th of 34 developed countries in science and 25th in math. President Obama recognizes that education is not only a driver of growth but also the surest way for individuals to share in the gains from growth. The challenge in developing a world-leading workforce involves both increasing educational attainment and enhancing the quality of education in this country. That is why

the President has established a goal for the United States to resume world leadership in college degree attainment by 2020. To reach this goal, the Nation must raise its college completion rate from 40 percent to 60 percent. That requires 8 million additional young people to graduate from America's colleges and universities over the next 10 years. The Administration has put forward a

two-pronged strategy that, first, seeks to ensure that higher education is accessible and affordable to all individuals and, second, promotes innovative reform to ensure educational quality.

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**Source:** Economic Report of the President, 2011  
U.S. Government Printing Office, pp. 63–72.



**I**n “The Spirit Level,” British academics Richard Wilkinson and Kate Pickett argue that the social costs of inequality are huge. They assert something like if the United Kingdom were to cut income inequality in half, murder rates would halve, mental illness would reduce by two-thirds, obesity would halve, imprisonment would reduce by 80 percent, teen births would reduce by 80 percent, and levels of trust would increase by 85 percent. While these purported effects of reducing inequality are unlikely and there are severe criticisms of the study, there are many people who, like Wilkinson and Pickett, worry a great deal about income inequality.

What does income inequality mean? Clearly, it means that few have much and many have little. But is this a problem? Measures of inequality tell us nothing about the living conditions of the poor, their health and their access to economic opportunity. Income inequality in a rich country could mean that the poorest members of that society are wealthier or better off than the wealthiest members of a poor country. Under a free-market system, those who are most productive receive the highest income. When the economy is growing, it is likely that a few have been so much more productive that they receive much higher incomes than others—but almost all incomes are rising. Consider the founders of Microsoft, Google, Facebook and others; while their wealth rose astronomically because they created new companies, they also created thousands of well paying jobs that would not have existed had the founders not introduced their companies.

While income inequality in the United States has risen over the past 100 years, would the poorest today choose to live in 1900? Life expectancy was only about 40 years, and life was tough. Very long workdays without vacations existed; common appliances today such as refrigerators, air conditioners, televisions, cable, the internet, computers

and many other items that make life better and easier did not exist. Very few people in a rich country would prefer to live as a wealthy person in that country 100 years ago.

According to the 2011 Economic Report of the President, different skill levels have led to much of the income inequality we observe. Jobs require much higher skills than a few years ago, but, according to the Report, not enough people have gone to college to acquire these skills. The Administration proposes to spend more to increase college graduation rates and enhance educational attainment. But is this necessary? Why won't a free market in labor lead people to select careers that pay more? And, as more people move into those occupations, won't wages slow their growth relative to wages in other sectors of the economy? The Report suggests that the demand for skilled workers has grown far faster than the supply of such workers. Again, if this has occurred and continues to occur, and those with skills earn increasingly more than those without skills, won't many without skills choose to acquire those skills? If higher skills generate increasingly higher incomes, won't that induce a lot more people to embark on a journey where they acquire these skills?

What would be the effects of a government-subsidized program for more people to be able to afford to attend college? More people would attend college, which would increase the demand for college and drive up the price of college. If the government subsidizes college, then many people who would not otherwise have chosen to attend college will attend. What effect might this have? Could it lead to increased drop-out rates as people who were not able to complete the requirements chose to attend college because it was subsidized by the government. Might it cause classes to lower requirements and quality of courses so that failure rates don't rise?



## CHAPTER 20

# World Trade Equilibrium

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### FUNDAMENTAL QUESTIONS

- 1 What are the prevailing patterns of trade between countries? What goods are traded?
- 2 What determines the goods that a nation will export?
- 3 How are the equilibrium price and the quantity of goods traded determined?
- 4 What are the sources of comparative advantage?



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**T**he United States' once-dominant position as an exporter of color television sets has since been claimed by nations like Japan and Taiwan. What caused this change? Is it because Japan specializes in the export of high-tech equipment? If countries tend to specialize in the export of particular kinds of goods, why does the United States import Heineken beer at the same time it exports Budweiser? This chapter will examine the volume of world trade and the nature of trade linkages between countries. As you saw in Chapter 2, trade occurs because of specialization in production. No single individual or country can produce everything better than anyone else can. The result is specialization of production based on comparative advantage. Remember that comparative advantage is in turn based on relative opportunity costs: A country will specialize in the production of those goods for which its opportunity costs of production are lower than the costs

in other countries. Nations then trade what they produce in excess of their own consumption to acquire other things that they want to consume. In this chapter, we will go a step further and discuss the sources of comparative advantage. We will look at why one country has a comparative advantage in, say, automobile production, while another country has a comparative advantage in wheat production.

The world equilibrium price and quantity traded are derived from individual countries' demand and supply curves. This relationship between the world trade equilibrium and individual country markets will be utilized in the chapter "International Trade Restrictions" to discuss the ways in which countries can interfere with free international trade to achieve their own economic or political goals.

## 1. An Overview of World Trade

Trade occurs because it makes people better off. International trade occurs because it makes people better off than they would be if they could consume only domestically produced products. In what sense are they better off? Goods are available at lower prices and with more variety in a world with trade than in a world in which every country consumes only what it produces. Who trades with whom, and what sorts of goods are traded? These are the questions we consider first, before investigating the underlying reasons for trade.



- 1** What are the prevailing patterns of trade between countries? What goods are traded?

### 1.a. The Direction of Trade

Table 1 shows patterns of trade between two large groups of countries: the industrial countries and the developing countries. The industrial countries include all of Western Europe, Japan, Australia, New Zealand, Canada, and the United States. The developing countries are, essentially, the rest of the world. Table 1 shows the dollar values and percentages of total trade between these groups of countries. The column at the left lists the origin of exports, and the row at the top lists the destination of imports.

As Table 1 shows, trade between industrial countries accounts for the bulk of international trade. Trade between industrial countries is a little more than \$5.2 trillion in value and amounts to 42 percent of world trade. Exports from industrial countries to developing countries represent 19 percent of total world trade. Exports from developing countries to industrial countries account for 25 percent of total trade, while exports from developing countries to other developing countries currently represent only 14 percent of international trade.

| TABLE 1 The Direction of Trade (in billions of dollars and percentages of world trade) |                      |                      |
|--|----------------------|----------------------|
| Origin   | Destination          |                      |
|  | Industrial Countries | Developing Countries |
| Industrial countries   | \$5,243<br>42%       | \$2,413<br>19%       |
| Developing countries   | \$3,098<br>25%       | \$1,811<br>14%       |

Source: IMF, *Direction of Trade Statistics Quarterly*, February 2011.



**TABLE 2** Major Trading Partners of Selected Countries

| United States |     |             |     | Canada         |     |             |     |
|---------------|-----|-------------|-----|----------------|-----|-------------|-----|
| Exports       |     | Imports     |     | Exports        |     | Imports     |     |
| Canada        | 19% | China       | 19% | U.S.           | 75% | U.S.        | 51% |
| Mexico        | 12% | Canada      | 14% | Japan          | 3%  | China       | 10% |
| Japan         | 5%  | Mexico      | 10% | U.K.           | 3%  | Japan       | 4%  |
| China         | 7%  | Japan       | 7%  | China          | 2%  | Mexico      | 4%  |
| U.K.          | 4%  | Germany     | 5%  | Mexico         | 1%  | Germany     | 3%  |
| Germany       |     |             |     | Mexico         |     |             |     |
| Exports       |     | Imports     |     | Exports        |     | Imports     |     |
| France        | 10% | Netherlands | 12% | U.S.           | 81% | U.S.        | 48% |
| U.S.          | 7%  | France      | 8%  | Canada         | 6%  | China       | 14% |
| U.K.          | 7%  | Belgium     | 7%  | Spain          | 2%  | Japan       | 6%  |
| Netherlands   | 7%  | Italy       | 6%  | Germany        | 2%  | Germany     | 4%  |
| Italy         | 6%  | U.K.        | 5%  | Japan          | 1%  | Canada      | 2%  |
| Japan         |     |             |     | United Kingdom |     |             |     |
| Exports       |     | Imports     |     | Exports        |     | Imports     |     |
| U.S.          | 16% | China       | 22% | U.S.           | 15% | Germany     | 13% |
| China         | 19% | U.S.        | 11% | Germany        | 11% | U.S.        | 10% |
| Korea         | 8%  | Australia   | 6%  | France         | 8%  | China       | 8%  |
| Hong Kong     | 5%  | Korea       | 4%  | Netherlands    | 8%  | Netherlands | 7%  |
| Singapore     | 3%  | Indonesia   | 4%  | Ireland        | 7%  | Belgium     | 5%  |

Source: IMF, *Direction of Trade Statistics Quarterly*, February 2011.

*Trade between industrial countries accounts for the bulk of international trade.*

*The volume of trade in fuels exceeds that of any other category of goods.*

Table 2 lists the major trading partners of selected countries and the percentage of total exports and imports accounted for by each country's top ten trading partners. For instance, 19 percent of U.S. exports went to Canada, and 7 percent of U.S. imports came from Japan. From a glance at the other countries listed in Table 2, it is clear that the United States is a major trading partner for many nations. This is true because of both the size of the U.S. economy and the nation's relatively high level of income. It is also apparent that Canada and Mexico are very dependent on trade with the United States: 75 percent of Canada's exports and 51 percent of its imports involve the United States, as do 81 percent of Mexico's exports and 48 percent of its imports. The dollar value of trade among the three North American nations is shown in Figure 1.

### 1.b. What Goods Are Traded?

Because countries differ in their comparative advantages, they will tend to export different goods. Countries also have different tastes and technological needs, and thus tend to differ in what they will import. Some goods are more widely traded than others, as Table 3 shows. Fuels like crude petroleum are the most heavily traded category of goods in the world, accounting for 15 percent of the total volume of world trade. Office and telecom equipment and chemicals are essentially tied for second place in share of world trade. The importance of a few major categories in international trade should not obscure the fact that international trade involves all sorts of products from all over the world.



**FIGURE 1** Merchandise Trade Flows in North America (billions of dollars)

In 2008, the United States exported \$260 billion worth of goods to Canada and imported \$340 billion of goods from Canada. The same year, U.S. merchandise exports to Mexico were \$152 billion, while merchandise imports from Mexico were \$218 billion.

**TABLE 3** World Merchandise Exports by Major Product Groups

| Product Category                   | Value (billion dollars) | Percentage of World Merchandise Trade |
|------------------------------------|-------------------------|---------------------------------------|
| <b>Agricultural products</b>       | <b>1,169</b>            | <b>9.6</b>                            |
| <b>Fuels &amp; mining products</b> | <b>2,263</b>            | <b>19.5</b>                           |
| <b>Fuels</b>                       | <b>1,608</b>            | <b>14.8</b>                           |
| <b>Manufactures (total)</b>        | <b>8,355</b>            | <b>69.8</b>                           |
| Iron & steel                       | 481                     | 4.0                                   |
| Chemicals                          | 1,447                   | 10.9                                  |
| Office & telecom equipment         | 1,323                   | 11.1                                  |
| Automotive products                | 847                     | 7.0                                   |
| Textiles                           | 211                     | 2.5                                   |
| Clothing                           | 316                     | 3.5                                   |

Note: Values in this table may not total 100 due to rounding.

Source: World Trade Organization, *International Trade Statistics 2010*; [http://www.wto.org/english/res\\_e/statis\\_e/its2010\\_e/its2010\\_e.pdf](http://www.wto.org/english/res_e/statis_e/its2010_e/its2010_e.pdf).

## RECAP

1. Trade between industrial countries accounts for the bulk of international trade.
2. The most important trading partners of the United States are Canada, Mexico, China, and Japan.
3. Fuels are the most heavily traded category of goods in the world, in terms of value of exports.
4. World trade is distributed across a great variety of products.



- 2 What determines the goods that a nation will export?

## 2. An Example of International Trade Equilibrium

The international economy is very complex. Each country has a unique pattern of trade, in terms both of trading partners and of goods traded. Some countries trade a great deal, and others trade very little. We already know that countries specialize and trade according to comparative advantage, but what are the fundamental determinants of international trade that explain the pattern of comparative advantage?

The answer to this question will in turn provide a better understanding of some basic questions about how international trade functions: What goods will be traded? How much will be traded? What prices will prevail for traded goods?

### 2.a. Comparative Advantage

Comparative advantage is found by comparing the relative costs of production in each country. We measure the cost of producing a particular good in two countries in terms of opportunity costs—what other goods must be given up in order to produce more of the good in question.

Table 4 presents a hypothetical example of two countries, the United States and India, that both produce two goods, wheat and cloth. The table lists the amounts of each good that can be produced by each worker. This example assumes that labor productivity differences alone determine comparative advantage. In the United States, a worker can produce either 8 units of wheat or 4 units of cloth. In India, a worker can produce 4 units of wheat or 3 units of cloth.

The United States has an **absolute advantage**—greater productivity—in producing both wheat and cloth. Absolute advantage is determined by comparing the absolute productivity of workers producing each good in different countries. Since one worker can

#### absolute advantage

An advantage derived from one country having a lower absolute input cost of producing a particular good than another country.



Comparative advantage is based on what a country can do relatively better than other countries. This photo shows a sheep in Canterbury, New Zealand. New Zealand has a comparative advantage in sheep raising and wool production.

**TABLE 4** An Example of Comparative Advantage

|       | Output per Worker per Day in Either Wheat or Cloth |       |
|-------|--|-------|
|       | U.S.   | India |
| Wheat | 8  | 4     |
| Cloth | 4  | 3     |

produce more of either good in the United States than in India, the United States is the more efficient producer of both goods.

It might seem that, since the United States is the more efficient producer of both goods, there would be no need for it to trade with India. But absolute advantage is not the critical consideration. What matters in determining the benefits of international trade is comparative advantage, as originally discussed in Chapter 2. To find the **comparative advantage**—the lower opportunity cost—we must compare the opportunity cost of producing each good in each country.

The opportunity cost of producing wheat is what must be given up in cloth using the same resources, like one worker per day. Look again at Table 4 to see the production of wheat and cloth in the two countries. Since one U.S. worker can produce 8 units of wheat or 4 units of cloth, if we take a worker from cloth production and move him to wheat production, we gain 8 units of wheat and lose 4 units of cloth.

The opportunity cost of producing wheat equals  $\frac{4}{8}$ , or  $\frac{1}{2}$ , unit of cloth:

$$\frac{\text{Output of cloth given up}}{\text{Output of wheat gained}} = \text{opportunity cost of producing 1 unit of wheat (in terms of cloth given up)}$$

$$\frac{4}{8} = \frac{1}{2}$$

Applying the same thinking to India, we find that one worker can produce 4 units of wheat or 3 units of cloth. The opportunity cost of producing 1 unit of wheat in India is  $\frac{3}{4}$  unit of cloth.

A comparison of the domestic opportunity costs in each country will reveal which one has the comparative advantage in producing each good. The U.S. opportunity cost of producing 1 unit of wheat is  $\frac{1}{2}$  unit of cloth; the Indian opportunity cost is  $\frac{3}{4}$  unit of cloth. Because the United States has a lower domestic opportunity cost, it has the comparative advantage in wheat production and will export wheat. Since wheat production costs are lower in the United States, India is better off trading for wheat rather than trying to produce it domestically.

The comparative advantage in cloth is found the same way. Taking a worker in the United States from wheat production and putting her in cloth production, we gain 4 units of cloth but lose 8 units of wheat per day. So the opportunity cost is

$$\frac{\text{Output of wheat given up}}{\text{Output of cloth gained}} = \text{opportunity cost of producing 1 unit of cloth (in terms of wheat given up)}$$

$$\frac{8}{4} = 2$$

In India, moving a worker from wheat to cloth production means that we gain 3 units of cloth but lose 4 units of wheat, so the opportunity cost is  $\frac{4}{3}$ , or  $1\frac{1}{3}$  units of wheat for 1 unit of cloth. Comparing the U.S. opportunity cost of 2 units of wheat with the Indian opportunity cost of  $1\frac{1}{3}$  units, we see that India has the comparative advantage in cloth production and will therefore export cloth. In this case, the United States is better off trading for cloth rather than producing it, since India's costs of production are lower.

### comparative advantage

An advantage derived from comparing the opportunity costs of production in two countries.



In international trade, as in other areas of economic decision making, it is opportunity cost that matters—and opportunity costs are reflected in comparative advantage. Absolute advantage is irrelevant, because knowing the absolute number of labor hours required to produce a good does not tell us if we can benefit from trade.

We benefit from trade if we are able to obtain a good from a foreign country by giving up less than we would have to give up to obtain the good at home. Because only opportunity cost can allow us to make such comparisons, international trade proceeds on the basis of comparative advantage.

*Countries export goods in which they have a comparative advantage.*

### terms of trade

The amount of an exported good that must be given up to obtain an imported good.

## 2.b. Terms of Trade

On the basis of comparative advantage, India will specialize in cloth production, and the United States will specialize in wheat production. The two countries will then trade with each other to satisfy the domestic demand for both goods. International trade permits greater consumption than would be possible from domestic production alone. Since countries trade when they can obtain a good more cheaply from a foreign producer than they can obtain it at home, international trade allows all traders to consume more. This is evident when we examine the terms of trade.

The **terms of trade** are the amount of an exported good that must be given up to obtain one unit of an imported good. The Global Business Insight “The Dutch Disease” provides a popular example of a dramatic shift in the terms of trade. As you saw earlier, comparative advantage dictates that the United States will specialize in wheat production and export wheat to India in exchange for Indian cloth. But the amount of wheat that the United States will exchange for a unit of cloth is limited by the domestic tradeoffs. If a unit of cloth can be obtained domestically for 2 units of wheat, the United States will be willing to trade with India only if the terms of trade are less than 2 units of wheat for a unit of cloth. India, in turn, will be willing to trade its cloth for U.S. wheat only if it can receive a better price than its domestic opportunity costs. Since a unit of cloth in India costs  $1\frac{1}{3}$  units of wheat, India will gain from trade if it can obtain more than  $1\frac{1}{3}$  units of wheat for its cloth.

The limits of the terms of trade are determined by the opportunity costs in each country:

1 unit of cloth for more than  $1\frac{1}{3}$  but less than 2 units of wheat

Within this range, the actual terms of trade will be decided by the bargaining power of the two countries. The closer the United States can come to giving up only  $1\frac{1}{3}$  units of wheat for cloth, the better the terms of trade for the United States. The closer India can come to receiving 2 units of wheat for its cloth, the better the terms of trade for India.

Though each country would like to push the other as close to the limits of the terms of trade as possible, any terms within the limits set by domestic opportunity costs will be mutually beneficial. Both countries benefit because they are able to consume goods at a cost that is less than their domestic opportunity costs. To illustrate the *gains from trade*, let us assume that the actual terms of trade are 1 unit of cloth for  $1\frac{1}{2}$  units of wheat.

Suppose the United States has 2 workers, one of whom goes to wheat production and the other to cloth production. This would result in U.S. production of 8 units of wheat and 4 units of cloth. Without international trade, the United States can produce and consume 8 units of wheat and 4 units of cloth. If the United States, with its comparative advantage in wheat production, chooses to produce only wheat, it can use both workers in wheat production and produce 16 units. If the terms of trade are  $1\frac{1}{2}$  units of wheat per unit of cloth, the United States can keep 8 units of wheat and trade the other 8 for  $5\frac{1}{3}$  units of cloth (8 divided by  $1\frac{1}{2}$ ). By trading U.S. wheat for Indian cloth, the United States is able to consume more than it could without trade. With no trade and

# GLOBAL BUSINESS INSIGHT



## The Dutch Disease

The terms of trade are the amount of an export that must be given up to obtain a certain quantity of an import. The price of an import will be equal to its price in the foreign country of origin multiplied by the exchange rate (the domestic-currency price of foreign currency). As the exchange rate changes, the terms of trade will change. This can have important consequences for international trade.

A problem can arise when one export industry in an economy is booming relative to others. In the 1970s, for instance, the Netherlands experienced a boom in its natural gas industry. The dramatic energy price increases of the 1970s resulted in large Dutch exports of natural gas. Increased demand for exports from the Netherlands caused

the Dutch currency to appreciate, making Dutch goods more expensive for foreign buyers. This situation caused the terms of trade to worsen for the Netherlands. Although the natural gas sector was booming, Dutch manufacturers were finding it difficult to compete in the world market.

This phenomenon of a boom in one industry causing declines in the rest of the economy is popularly called the Dutch Disease. It is usually associated with dramatic increases in the demand for a primary commodity, and it can afflict any nation experiencing such a boom. For instance, a rapid rise in the demand for coffee could lead to a Dutch Disease problem for Colombia, where a coffee boom would be accompanied by a decline in other sectors of the economy.

half its labor devoted to each good, the United States could consume 8 units of wheat and 4 units of cloth. After trade, the United States consumes 8 units of wheat and  $5\frac{1}{3}$  units of cloth. By devoting all its labor hours to wheat production and trading wheat for cloth, the United States gains  $1\frac{1}{3}$  units of cloth. This is the gain from trade—an increase in consumption, as summarized in Table 5.

*The gain from trade is increased consumption.*

## 2.c. Export Supply and Import Demand

The preceding example suggests that countries benefit from specialization and trade. Realistically, however, countries do not completely specialize. Typically, domestic industries satisfy part of the domestic demand for goods that are also imported. To understand how the quantity of goods traded is determined, we must construct demand and supply curves for each country and use them to create export supply and import demand curves.

The proportion of domestic demand for a good that is satisfied by domestic production and the proportion that will be satisfied by imports are determined by the domestic supply and demand curves and the international equilibrium price of a good. The international equilibrium price and quantity may be determined once we know the export supply and import demand curves for each country. These curves are derived from the

**TABLE 5** Hypothetical Example of U.S. Gains from Specialization and Trade

### Without International Trade

- 1 worker in wheat production: produce and consume 8 wheat
- 1 worker in cloth production: produce and consume 4 cloth

### With Specialization and Trade

- 2 workers in wheat production: produce 16 wheat and consume 8; trade 8 wheat for  $5\frac{1}{3}$  cloth

**Before Trade:** consume 8 wheat and 4 cloth

**After Trade:** consume 8 wheat and  $5\frac{1}{3}$  cloth; gain  $1\frac{1}{3}$  cloth by specialization and trade



domestic supply and demand in each country. Figure 2 illustrates the derivation of the export supply and import demand curves.

Figure 2(a) shows the domestic supply and demand curves for the U.S. wheat market. The domestic equilibrium price is \$6, and the domestic equilibrium quantity is 200 million bushels. (The domestic no-trade equilibrium price is the price that exists prior to international trade.) A price above \$6 will yield a U.S. wheat surplus. For instance, at a price of \$9, the U.S. surplus will be 200 million bushels. A price below equilibrium will produce a wheat shortage: At a price of \$3, the shortage will be 200 million bushels. The key point here is that the world price of a good may be quite different from the domestic no-trade equilibrium price. And once international trade occurs, the world price will prevail in the domestic economy.

If the world price of wheat is different from a country's domestic no-trade equilibrium price, the country will become an exporter or an importer. For instance, if the world price is above the domestic no-trade equilibrium price, the domestic surplus can be exported to the rest of the world. Figure 2(b) shows the U.S. **export supply curve**. This curve illustrates the U.S. domestic surplus of wheat for prices above the domestic no-trade equilibrium price of \$6. At a world price of \$9, the United States would supply 200 million bushels of wheat to the rest of the world. The export supply is equal to the domestic surplus. The higher the world price above the domestic no-trade equilibrium, the greater the quantity of wheat exported by the United States.

If the world price of wheat is below the domestic no-trade equilibrium price, the United States will import wheat. The **import demand curve** is the amount of the U.S. shortage at various prices below the no-trade equilibrium. In Figure 2(b), the import demand curve is a downward-sloping line, indicating that the lower the price below the domestic no-trade equilibrium of \$6, the greater the quantity of wheat imported by the United States. At a price of \$3, the United States will import 200 million bushels.

The domestic supply and demand curves and the export supply and import demand curves for India appear in Figures 2(c) and (d). The domestic no-trade equilibrium price in India is \$12. At this price, India would neither import nor export any wheat because the domestic demand would be satisfied by the domestic supply. The export supply curve for India is shown in Figure 2(d) as an upward-sloping line that measures the amount of the domestic surplus as the price level rises above the domestic no-trade equilibrium price of \$12. According to Figure 2(c), if the world price of wheat is \$15, the domestic surplus in India is equal to 200 million bushels. The corresponding point on the export supply curve indicates that at a price of \$15, 200 million bushels will be exported. The import demand curve for India reflects the domestic shortage at a price below the domestic no-trade equilibrium price. At \$9, the domestic shortage is equal to 200 million bushels; the import demand curve indicates that at \$9, 200 million bushels will be imported.

### export supply curve

A curve showing the relationship between the world price of a good and the amount that a country will export.

### import demand curve

A curve showing the relationship between the world price of a good and the amount that a country will import.



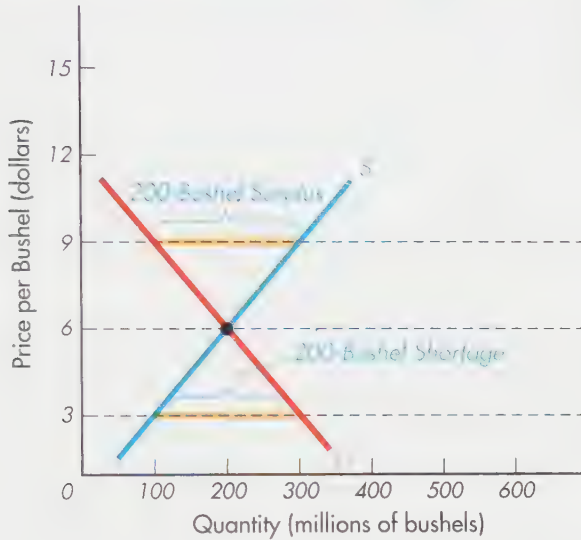
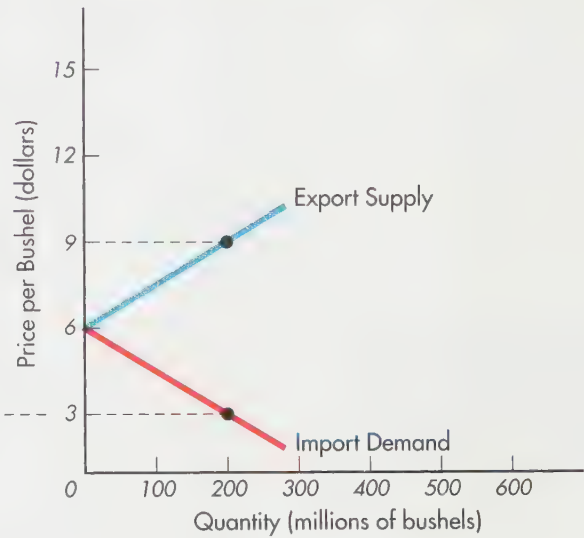
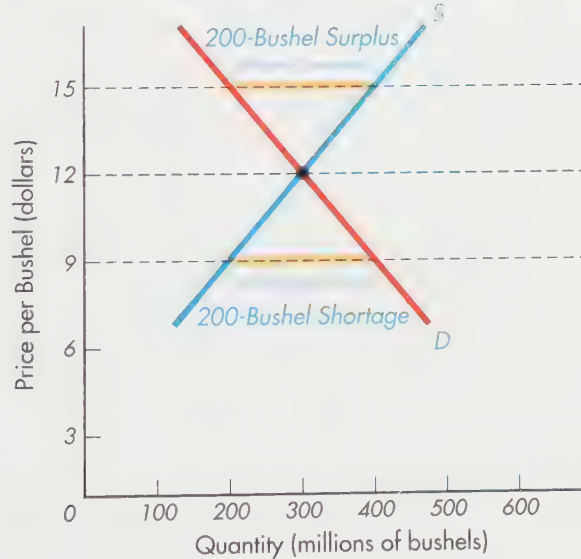
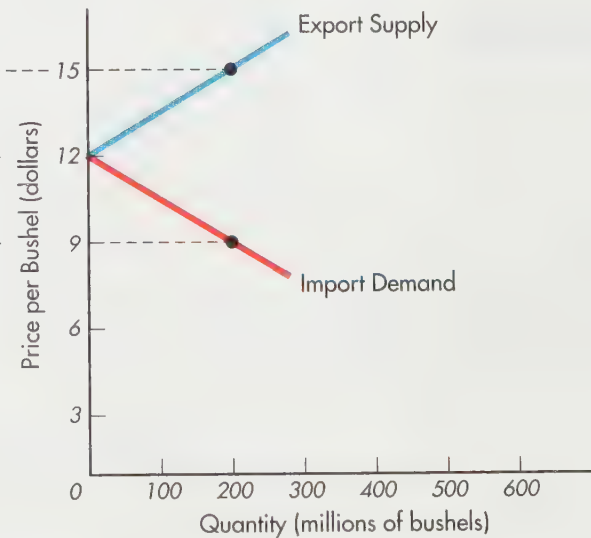
- 3** How are the equilibrium price and the quantity of goods traded determined?

## 2.d. The World Equilibrium Price and Quantity Traded

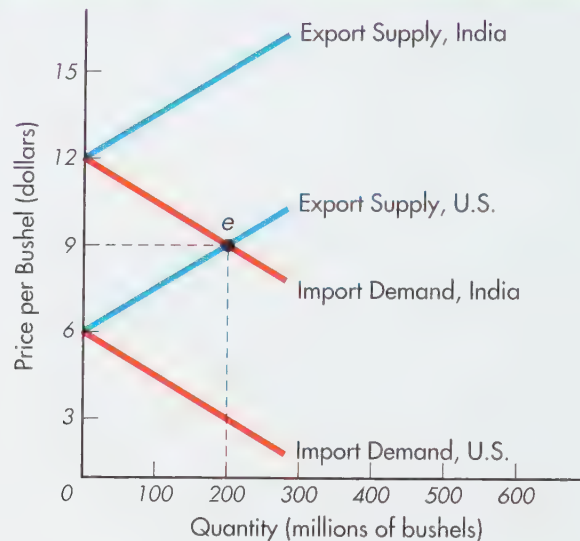
The international equilibrium price of wheat and the quantity of wheat traded are found by combining the import demand and export supply curves for the United States and India, as in Figure 3. International equilibrium occurs if the quantity of imports demanded by one country is equal to the quantity of exports supplied by the other country. In Figure 3, this equilibrium occurs at the point labeled *e*. At this point, the import demand curve for India indicates that India wants to import 200 million bushels at a price of \$9. The export supply curve for the United States indicates that the United States wants to export 200 million bushels at a price of \$9. Only at \$9 will the quantity of wheat demanded by the importing nation equal the quantity of wheat supplied by the exporting nation. So the equilibrium world price of wheat is \$9, and the equilibrium quantity of wheat traded is 200 million bushels.

*International equilibrium occurs at the point where the quantity of imports demanded by one country is equal to the quantity of exports supplied by the other country.*



**FIGURE 2** The Import Demand and Export Supply Curves**(a) U.S. Domestic Wheat Market****(b) U.S. Import Demand and Export Supply****(c) Indian Domestic Wheat Market****(d) Indian Import Demand and Export Supply**

Figures 2(a) and 2(c) show the domestic demand and supply curves for wheat in the United States and India, respectively. The domestic no-trade equilibrium price is \$6 in the United States and \$12 in India. Any price above the domestic no-trade equilibrium prices will create domestic surpluses, which are reflected in the export supply curves in Figures 2(b) and 2(d). Any price below the domestic no-trade equilibrium prices will create domestic shortages, which are reflected in the import demand curves in Figures 2(b) and 2(d).

**FIGURE 3** International Equilibrium Price and Quantity

The international equilibrium price is the price at which the export supply curve of the United States intersects the import demand curve of India. At the equilibrium price of \$9, the United States will export 200 million bushels to India.

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## RECAP

1. Comparative advantage is based on the relative opportunity costs of producing goods in different countries.
2. A country has an absolute advantage when it can produce a good more efficiently than can other nations.
3. A country has a comparative advantage when the opportunity cost of producing a good, in terms of forgone output of other goods, is lower than that of other nations.
4. The terms of trade are the amount of an export good that must be given up to obtain one unit of an import good.
5. The limits of the terms of trade are determined by the domestic opportunity costs of production in each country.
6. The export supply and import demand curves measure the domestic surplus and shortage, respectively, at different world prices.
7. International equilibrium occurs at the point where one country's import demand curve intersects with the export supply curve of another country.



- 4 What are the sources of comparative advantage?

## 3. Sources of Comparative Advantage

We know that countries specialize and trade in accordance with comparative advantage, but what gives a country a comparative advantage? Economists have suggested several theories of the source of comparative advantage. Let us review these theories.

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### 3.a. Productivity Differences

The example of comparative advantage given earlier in this chapter showed the United States to have a comparative advantage in wheat production and India to have a comparative advantage in cloth production. Comparative advantage was determined by differences in the number of labor hours required to produce each good. In this example, differences in the *productivity* of labor accounted for comparative advantage.

For over two hundred years, economists have argued that productivity differences account for comparative advantage. In fact, this theory of comparative advantage is often called the *Ricardian model*; after David Ricardo, a nineteenth-century English economist who explained and analyzed the idea of productivity-based comparative advantage. Variations in the productivity of labor can explain many observed trade patterns in the world.

Although we know that labor productivity differs across countries, and that this can help explain why countries produce the goods they do, there are factors other than labor productivity that determine comparative advantage. Furthermore, even if labor productivity were all that mattered, we would still want to know why some countries have more productive workers than others. The standard interpretation of the Ricardian model is that technological differences between countries account for differences in labor productivity. The countries with the most advanced technology would have a comparative advantage with regard to those goods that can be produced most efficiently with modern technology.

*Comparative advantage due to productivity differences between countries is often called the Ricardian model of comparative advantage.*

### 3.b. Factor Abundance

Goods differ in terms of the resources, or factors of production, required for their production. Countries differ in terms of the abundance of different factors of production: land, labor, capital, and entrepreneurial ability. It seems self-evident that countries would have an advantage in producing those goods that use relatively large amounts of their most abundant factor of production. Certainly countries with a relatively large amount of farmland would have a comparative advantage in agriculture, and countries with a relatively large amount of capital would tend to specialize in the production of manufactured goods.

The idea that comparative advantage is based on the relative abundance of factors of production is sometimes called the *Heckscher-Ohlin model*, after the two Swedish economists, Eli Heckscher and Bertil Ohlin, who developed the original argument. The original model assumed that countries possess only two factors of production: labor and capital. Thus, researchers have examined the labor and capital requirements of various industries to see whether labor-abundant countries export goods whose production is relatively labor intensive, and capital-abundant countries export goods that are relatively capital intensive. In many cases, factor abundance has served well as an explanation of observed trade patterns. However, there are cases in which comparative advantage seems to run counter to the predictions of the factor-abundance theory. In response, economists have suggested other explanations for comparative advantage.

*Comparative advantage based on differences in the abundance of factors of production across countries is described in the Heckscher-Ohlin model.*

### 3.c. Other Theories of Comparative Advantage

New theories of comparative advantage have typically been developed in an effort to explain the trade pattern in some narrow category of products. They are not intended to serve as general explanations of comparative advantage, as do factor abundance and productivity. These supplementary theories emphasize human skills, product life cycles, and preferences.



**Human Skills** This approach emphasizes differences across countries in the availability of skilled and unskilled labor. The basic idea is that countries with a relatively abundant stock of highly skilled labor will have a comparative advantage in producing goods that require relatively large amounts of skilled labor. This theory is similar to the factor-abundance theory, except that here the analysis rests on two segments (skilled and unskilled) of the labor factor.

The human skills argument is consistent with the observation that most U.S. exports are produced in high-wage (skilled labor) industries and most U.S. imports are products produced in relatively low-wage industries. Since the United States has a well-educated labor force, relative to many other countries, we would expect the United States to have a comparative advantage in industries requiring a large amount of skilled labor. Developing countries would be expected to have a comparative advantage in industries requiring a relatively large amount of unskilled labor.

*Manufactured goods have life cycles. At first they are produced by the firm that invented them. Later, they may be produced by firms in other countries that copy the technology of the innovator.*

**Product Life Cycles** This theory explains how comparative advantage in a specific good can shift from one country to another over time. This occurs because goods experience a *product life cycle*. At the outset, development and testing are required to conceptualize and design the product. For this reason, the early production will be undertaken by an innovative firm. Over time, however, a successful product tends to become standardized, in the sense that many manufacturers can produce it. The mature product may be produced by firms that do little or no research and development, specializing instead in copying successful products that were invented and developed by others.

The product life cycle theory is related to international comparative advantage in that a new product will first be produced and exported by the nation in which it was invented. As the product is exported elsewhere and foreign firms become familiar with it, the technology is copied in other countries by foreign firms seeking to produce a competing version. As the product matures, comparative advantage shifts away from the country of origin if other countries have lower manufacturing costs using the now-standardized technology.

The history of color television production shows how comparative advantage can shift over the product life cycle. Color television was invented in the United States, and U.S. firms initially produced and exported color TVs. Over time, as the technology of color television manufacturing became well known, countries like Japan and Taiwan came to dominate the business. Firms in these countries had a comparative advantage over U.S. firms in the manufacture of color televisions. Once the technology is widely available, countries with lower production costs, due to lower wages, can compete effectively against the higher-wage nation that developed the technology.

**Preferences** The theories of comparative advantage that we have looked at so far have all been based on supply factors. It may be, though, that the demand side of the market can explain some of the patterns observed in international trade. Different producers' goods are seldom exactly identical. Consumers may prefer the goods of one firm to those of another firm. Domestic firms usually produce goods to satisfy domestic consumers. But since different consumers have different preferences, some consumers will prefer goods produced by foreign firms. International trade allows consumers to expand their consumption opportunities.

Consumers who live in countries with similar levels of development can be expected to have similar consumption patterns. The consumption patterns of consumers in countries at quite different levels of development are much less similar. This would suggest that firms in industrial countries will find a larger market for their goods in other industrial countries than in developing countries.

As you saw earlier in this chapter, industrial countries tend to trade with other industrial countries. This pattern runs counter to the factor-abundance theory of comparative advantage, which would suggest that countries with the most dissimilar endowments of resources would find trade most beneficial. Yet rich countries, with large supplies of capital and skilled labor forces, trade more actively with other rich countries than they do with poor countries. Firms in industrial countries tend to produce goods that relatively wealthy consumers will buy. The key point here is that we do not live in a world based on simple comparative advantage, in which all cloth is identical, regardless of the producer. We inhabit a world of differentiated products, and consumers want choices between different brands or styles of a seemingly similar good.

Another feature of international trade that may be explained by consumer preference is **intraindustry trade**, a circumstance in which a country both exports and imports goods in the same industry. The fact that the United States exports Budweiser beer and imports Heineken beer is not surprising when preferences are taken into account. Supply-side theories of comparative advantage rarely provide an explanation of intraindustry trade, since they would expect each country to export only those goods produced by industries in which a comparative advantage exists. Yet the real world is characterized by a great deal of intraindustry trade.

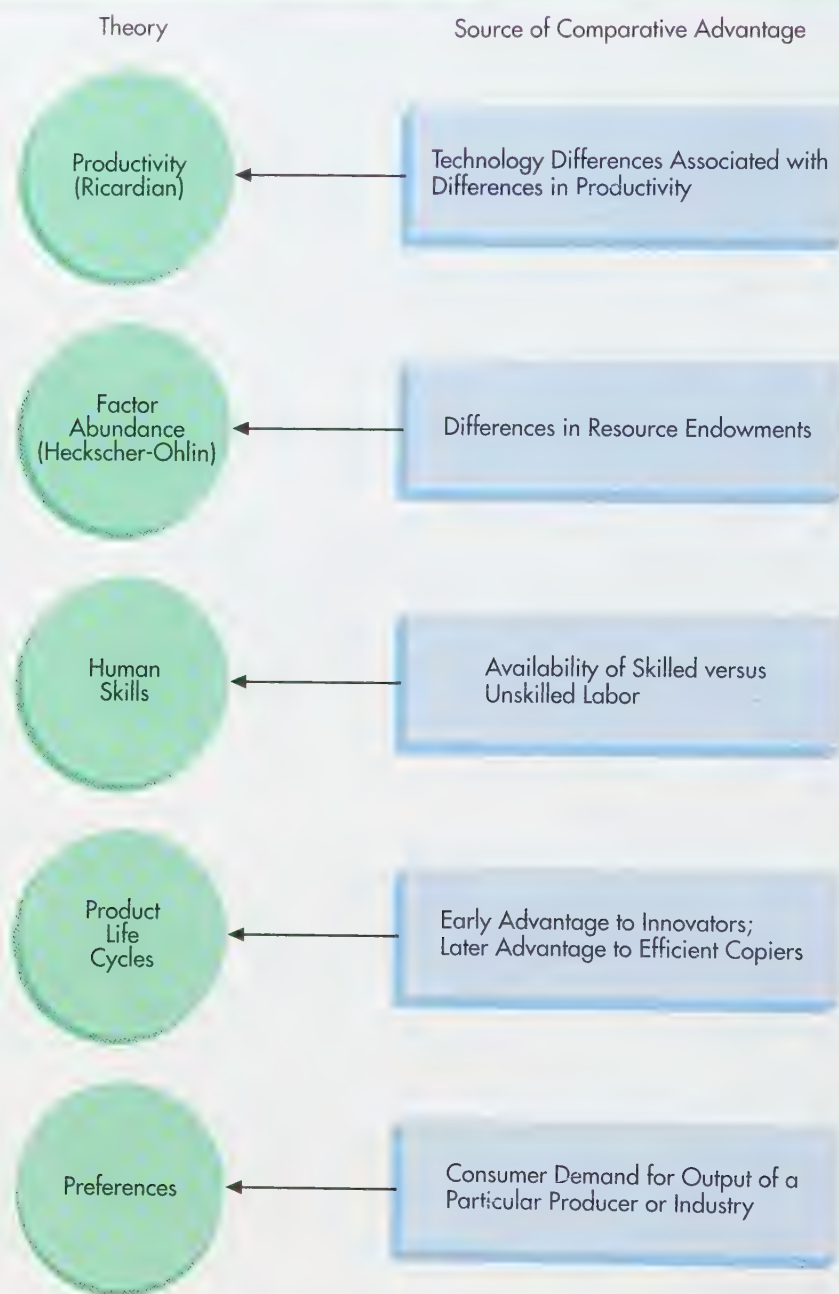
#### **intraindustry trade**

The simultaneous import and export of goods in the same industry by a particular country.

We have discussed several potential sources of comparative advantage: labor productivity, factor abundance, human skills, product life cycles, and preferences. Each of these theories, which are summarized in Figure 4, has proven useful in understanding certain trade patterns. Each has also been shown to have limitations as a general theory that is applicable to all cases. Once again we are reminded that the world is a very complicated place. Theories are simpler than reality. Nevertheless, they help us to understand how comparative advantage arises.

## **RECAP**

1. Comparative advantage can arise because of differences in labor productivity.
2. Countries differ in their resource endowments, and a given country may enjoy a comparative advantage in products that use its most abundant factor of production intensively.
3. Industrial countries may have a comparative advantage in products requiring a large amount of skilled labor. Developing countries may have a comparative advantage in products requiring a large amount of unskilled labor.
4. Comparative advantage in a new good initially resides in the country that invented the good. Over time, other nations learn the technology and may gain a comparative advantage in producing the good.
5. In some industries, consumer preferences for differentiated goods may explain international trade flows, including industry trade.

**FIGURE 4** Theories of Comparative Advantage

Several theories exist that explain comparative advantage: labor productivity, factor abundance, human skills, product life cycles, and preferences.



## SUMMARY

1. What are the prevailing patterns of trade between countries? What goods are traded?
  - International trade flows largely between industrial countries. §1.a
  - International trade involves many diverse products. §1.b
2. What determines the goods that a nation will export?
  - Comparative advantage is based on the opportunity costs of production. §2.a
  - Domestic opportunity costs determine the limits of the terms of trade between two countries—that is, the amount of exports that must be given up to obtain imports. §2.b
  - The export supply curve shows the domestic surplus and amount of exports available at alternative world prices. §2.c
  - The import demand curve shows the domestic shortage and amount of imports demanded at alternative world prices. §2.c
3. How are the equilibrium price and the quantity of goods traded determined?
  - The international equilibrium price and quantity of a good traded are determined by the intersection of the export supply curve of one country with the import demand curve of another country. §2.d
4. What are the sources of comparative advantage?
  - The productivity-differences and factor-abundance theories of comparative advantage are general theories that seek to explain patterns of international trade flow. §3.a, 3.b
  - Other theories of comparative advantage aimed at explaining trade in particular kinds of goods focus on human skills, product life cycles, and consumer preferences. §3.c

## KEY TERMS

absolute advantage, 436  
comparative advantage, 437

export supply curve, 440  
import demand curve, 440

intraindustry trade, 445  
terms of trade, 438

## EXERCISES

1. Why must voluntary trade between two countries be mutually beneficial?

Use the following table for exercises 2–6.

**Amount of Beef or Computers Produced by One Worker in a Day**

|           | Canada | Japan |
|-----------|--------|-------|
| Beef      | 8      | 5     |
| Computers | 3      | 4     |

2. Which country has the absolute advantage in beef production?
3. Which country has the absolute advantage in computer production?
4. Which country has the comparative advantage in beef production?
5. Which country has the comparative advantage in computer production?
6. What are the limits of the terms of trade? Specifically, when is Canada willing to trade with Japan, and when is Japan willing to trade with Canada?

7. Use the following supply and demand schedule for two countries to determine the international equilibrium price of shoes. How many shoes will be traded?

**Demand and Supply of Shoes (in thousands)**

| Price | Mexico           |                  | Chile            |                  |
|-------|------------------|------------------|------------------|------------------|
|       | Qty.<br>Demanded | Qty.<br>Supplied | Qty.<br>Demanded | Qty.<br>Supplied |
| \$10  | 40               | 0                | 55               | 0                |
| \$20  | 35               | 20               | 44               | 10               |
| \$30  | 30               | 40               | 33               | 20               |
| \$40  | 25               | 60               | 22               | 30               |
| \$50  | 20               | 80               | 11               | 40               |

8. How would each of the following theories of comparative advantage explain the fact that the United States exports computers?
- Productivity differences
  - Factor abundance
  - Human skills
  - Product life cycle
  - Preferences
9. Which of the theories of comparative advantage could explain why the United States exports computers to Japan at the same time that it imports computers from Japan? Explain.
10. Developing countries have complained that the terms of trade they face are unfavorable. If they voluntarily engage in international trade, what do you suppose they mean by “unfavorable terms of trade”?
11. If two countries reach equilibrium in their domestic markets at the same price, what can be said about their export supply and import demand curves and about the international trade equilibrium?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

## LETTER TO SENATE MAJORITY LEADER HARRY REID

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January 30, 2008

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The Honorable Harry Reid  
Majority Leader  
United States Senate  
U.S. Senate, S-221  
Washington, DC 20515  
Dear Majority Leader Reid:

**W**e would like to offer our support for prioritizing trade legislation addressing China. We face a host of difficult trade issues with China that require strong action, ranging from currency manipulation and unfair subsidies, to trade law and counterfeit enforcement problems, to imported food and product safety. These issues are hurting American competitiveness and expose American consumers to unsafe goods.

The problems facing workers and manufacturers due to unfair trading practices in China and other countries are growing more severe each day. The U.S. trade deficit with China hit \$237.5 billion through November 2007, eclipsing the previous year's record of \$232.6 billion. This is the highest annual imbalance ever recorded with a single country—and December's figures have yet to be calculated. The deficit with China now accounts for 32.5 percent of the U.S. total trade deficit in goods—and more than half of the U.S. non-petroleum goods deficit.

China is by far the leading violator of international trade rules and its actions continue to harm American workers, industry, and manufacturing. China has done little to address the fundamental misalignment of its currency, a practice that continues to take jobs and wealth from the United States. There is also strong evidence that the massive subsidies the Chinese government provides its producers gives them an unfair advantage in international trade. These factors, in addition to low wages, unsafe working conditions, and the absence of worker rights, have contributed to the loss of millions of manufacturing jobs and our country's reliance on imports.

The American people are demanding action to stop our trading partners from rigging the game. It is time for Congress to meet that demand and take strong action.

It is our belief that any such measure taken to correct this imbalance should ensure that China and other nations float their currencies against the dollar and the other currencies of the world. Should China and other nations fail to do so, an appropriate remedy would treat currency misalignment as a subsidy that is countervailable under U.S. trade law.

We also support provisions that would apply countervailing duties to non-market economies.

Current anti-subsidies rules allow the world's largest trade subsidizer, China, to continue its unfair practices without penalty.

Further, we believe it is necessary to ensure that World Trade Organization decisions do not undermine trade law enforcement. We must ensure that U.S. anti-dumping law will work effectively and fairly against China and other trade law violators.

Since Congress granted permanent normal trade relations status to China, intellectual property theft and illegal counterfeiting have increased, costing American businesses billions of dollars annually. We believe a comprehensive approach to China trade issues must include attention to intellectual property enforcement.

Finally, the recent recalls of unsafe toys, food, and other products from China emphasize the need to ensure that our trading system protects public health and safety. While the President's Inter-agency Working Group on Import Safety has developed recommendations for the federal government and industry to follow, we believe that memoranda of understanding with China alone cannot ensure the safety of products for American consumers. We would like to ensure that increased Customs and Border Patrol surveillance of imported food and products and market-based



principles be considered to ensure that importers of products from all countries are liable for their safety and quality.

The challenges facing our nation's manufacturers, farmers, and workers increase with each

passing week. We support efforts to address these issues in a comprehensive manner before the consideration of proposed free trade agreements, and we share the view that now is the time to move legislation forward.

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**Source:** Senator Sherrod Brown website listing letter sent by eight senators to Senate Majority Leader Reid: [http://brown.senate.gov/newsroom/press\\_releases/release/?id=45ebb90f-c7be-4e54-815b-eaab5a57a533](http://brown.senate.gov/newsroom/press_releases/release/?id=45ebb90f-c7be-4e54-815b-eaab5a57a533).

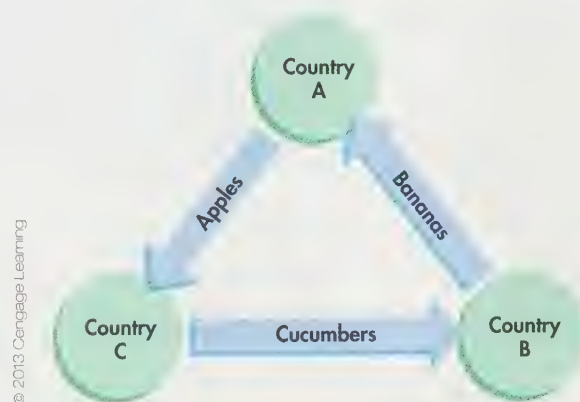
There is no lack of stories in the U.S. media on the threat of foreign economic domination. As this letter indicates, officials within the U.S. government were concerned about U.S. trade with China. The United States had experienced a growing trade deficit with China, and some senators wanted action to address what they saw as unfair international trade practices by China.

However, the bilateral trade accounts provide little, if any, information on such issues. Indeed, it is easy to think of an example in which a country has a persistent trade deficit with one of its trading partners but has its overall trade account in balance. Suppose there are three countries that trade among themselves, which we will call countries A, B, and C. The people of each country produce only one type of good and consume only one other type of good. The people of country A produce apples and consume bananas, the people of country B produce bananas and consume cucumbers, and the people of country C produce cucumbers and consume apples. Even when the trade account of each country is balanced, each has a deficit with one of its trading partners and a surplus with the other. Furthermore, a larger trade deficit between countries A and B (with each country retaining balanced trade) implies that the people of country A are better off, since they are consuming more. If the government of country A tried to impose a law forcing bilateral trade balance with country B, citizens of country A could not consume as many bananas as before and would be forced to attempt to sell apples to the uninterested citizens of country B.

This simple example demonstrates that the U.S. trade deficit with China should not in itself be a

cause for concern. The United States could have a persistent trade deficit with China and yet maintain an overall balanced trade account. In fact, any country would be expected to have a trade deficit with some countries and a trade surplus with others. This reflects comparative advantage. Trade between countries makes both the exporting and the importing countries better off.

This is not to say that there may not be problems in terms of China failing to allow U.S. exporters access to its consumers, or problems with pirating of intellectual property, or problems in exchange rate management. Also, concern about the overall trade deficit may be well founded. An overall trade deficit indicates that a country is consuming more than it is producing. At any particular time, a country may want to run a trade deficit or a trade surplus, depending on the circumstances it faces. But regardless of the overall trade account of a country, we should expect bilateral trade imbalances among trading partners.



# International Trade Restrictions

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### FUNDAMENTAL QUESTIONS

- 1 Why do countries restrict international trade?
- 2 How do countries restrict the entry of foreign goods and promote the export of domestic goods?
- 3 What sorts of agreements do countries enter into to reduce barriers to international trade?

**T**he Japanese government once announced that foreign-made skis would not be allowed into Japan because they were unsafe. Japanese ski manufacturers were active supporters of the ban. The U.S. government once imposed a tax of almost 50 percent on imports of motorcycles with engines larger than 700 cc. The only U.S.-owned motorcycle manufacturer, Harley-Davidson, produced no motorcycles with engines smaller than 1,000 cc and so did not care about the small-engine market. In the mid-1980s, Britain began replacing the distinctive red steel telephone booths that were used all through the country with new booths. Many U.S. residents were interested in buying an old British phone booth to use as a decorative novelty, so the phone booths were exported to the United States. However, when the phone booths arrived, the U.S. Customs Service impounded them because there was a limit on the amount of iron and steel products that could



be exported from Britain to the United States. The phone booths would be allowed to enter the country only if British exports of some other iron and steel products were reduced. The British exporters protested the classification of the phone booths as iron and steel products and argued that they should be considered antiques (which have no import restrictions). The phone booths were not reclassified; as a result, few have entered the United States, and prices of old British phone booths have been in the thousands of dollars. There are many examples of government policy influ-

encing the prices and quantities of goods that are traded internationally.

International trade is rarely determined solely by comparative advantage and the free market forces of supply and demand. Governments often find that political pressures favor policies that at least partially offset the prevailing comparative advantages. Government policy aimed at influencing international trade flows is called **commercial policy**. This chapter first examines the arguments in support of commercial policy and then discusses the various tools of commercial policy employed by governments.

#### commercial policy

Government policy that influences international trade flows.

## 1. Arguments for Protection

Governments restrict foreign trade to protect domestic producers from foreign competition. In some cases the protection may be justified; in most cases it harms consumers. Of the arguments used to promote such protection, only a few are valid. We will look first at arguments that are widely considered to have little or no merit, and then at those that may sometimes be valid.

International trade on the basis of comparative advantage maximizes world output and allows consumers access to better-quality products at lower prices than would be available in the domestic market alone. If trade is restricted, consumers pay higher prices for lower-quality goods, and world output declines. Protection from foreign competition imposes costs on the domestic economy as well as on foreign producers. When production does not proceed on the basis of comparative advantage, resources are not expended on their most efficient uses. Whenever government restrictions alter the pattern of trade, we should expect someone to benefit and someone else to suffer. Generally speaking, protection from foreign competition benefits domestic producers at the expense of domestic consumers.



### 1 Why do countries restrict international trade?

*Protection from foreign competition generally benefits domestic producers at the expense of domestic consumers.*

### 1.a. Creation of Domestic Jobs

If foreign goods are kept out of the domestic economy, it is often argued, jobs will be created at home. This argument holds that domestic firms will produce the goods that otherwise would have been produced abroad, thus employing domestic workers instead of foreign workers. The weakness of this argument is that only the protected industry will benefit in terms of employment. Since domestic consumers will pay higher prices to buy the output of the protected industry, they will have less to spend on other goods and services, which could cause employment in other industries to drop. In addition, if other countries retaliate by restricting the entry of U.S. exports, the output of U.S. firms that produce for export will fall as well. Typically, restrictions to “save domestic jobs” simply redistribute jobs by creating employment in the protected industry and reducing employment elsewhere.

**TABLE 1** The Cost of Protecting U.S. Jobs from Foreign Competition

| Protected Industry               | Jobs Saved | Total Cost<br>(in millions) | Annual Cost<br>per Job Saved |
|----------------------------------|------------|-----------------------------|------------------------------|
| Benzenoid chemicals              | 216        | \$ 297                      | \$1,376,435                  |
| Luggage                          | 226        | 290                         | 1,285,078                    |
| Softwood lumber                  | 605        | 632                         | 1,044,271                    |
| Sugar                            | 2,261      | 1,868                       | 826,104                      |
| Polyethylene resins              | 298        | 242                         | 812,928                      |
| Dairy products                   | 2,378      | 1,630                       | 685,323                      |
| Frozen concentrated orange juice | 609        | 387                         | 635,103                      |
| Ball bearings                    | 146        | 88                          | 603,368                      |
| Maritime services                | 4,411      | 2,522                       | 571,668                      |
| Ceramic tiles                    | 347        | 191                         | 551,367                      |
| Machine tools                    | 1,556      | 746                         | 479,452                      |
| Ceramic articles                 | 418        | 140                         | 335,876                      |
| Women's handbags                 | 773        | 204                         | 263,535                      |
| Canned tuna                      | 390        | 100                         | 257,640                      |
| Glassware                        | 1,477      | 366                         | 247,889                      |
| Apparel and textiles             | 168,786    | 33,629                      | 199,241                      |
| Peanuts                          | 397        | 74                          | 187,223                      |
| Rubber footwear                  | 1,701      | 286                         | 168,312                      |
| Women's nonathletic footwear     | 3,702      | 518                         | 139,800                      |
| Costume jewelry                  | 1,067      | 142                         | 132,870                      |
| Total                            | 191,764    | \$44,252                    |                              |
| Average (weighted)               |            |                             | \$ 231,289                   |

**Source:** Federal Reserve Bank of Dallas 2002 Annual Report, "The Fruits of Free Trade," by W. Michael Cox and Richard Alm, <http://dallasfed.org/fed/annual/2002/ar02f.cfm>.

Table 1 shows estimates of the cost of saving U.S. jobs from foreign competition. For instance, the cost of saving 226 jobs in the U.S. luggage industry is \$290 million, or \$1,285,078 per worker. Studies have consistently shown that the costs of protecting domestic jobs typically outweigh the benefits. So while it is possible to erect barriers to foreign competition and save domestic jobs, restricting international trade may impose large costs on an economy. Consumers end up paying much more for the goods they buy in order to subsidize the relatively inefficient domestic producer.

Table 2 shows the annual cost to the United States of import restrictions in terms of reduced GDP as estimated by an agency of the U.S. government. The total estimated amount of \$4,622 million means that U.S. GDP would be over \$4.6 billion higher without import restrictions. This estimate by the U.S. International Trade Commission incorporates estimates of all gains and losses from labor and capital income, tax revenue changes, and effects on consumption of changes in prices of goods and services. The amount of \$4.6 billion is a very small fraction of U.S. GDP but would involve substantial changes for a few industries. For instance, in fabric mills, employment would fall by 11 percent and output by about 10 percent, and in the ball bearings sector, employment and output would both fall about 4.3 percent.

*Saving domestic jobs from foreign competition may cost domestic consumers more than it benefits the protected industries.*

**TABLE 2** Annual Gain in U.S. GDP if U.S. Import Restrictions Were Eliminated

| Sector  | GDP Gain<br>(millions of dollars) |
|---|-----------------------------------|
| Simultaneous liberalization of all significant restraints | 4,622                             |
| Individual liberalization                                 |                                   |
| Textiles and apparel                                      | 2,254                             |
| Dairy   | 733                               |
| Sugar   | 514                               |
| Ethyl alcohol   | 356                               |
| Footwear and leather products                             | 325                               |
| Tobacco   | 99                                |
| Tuna  | 23                                |
| Costume jewelry   | 21                                |
| Ball and roller bearings                                  | 14                                |
| Pens, mechanical pencils, and parts                       | 13                                |
| Cutlery and hand tools                                    | 13                                |
| Table and kitchenware                                     | 10                                |
| Watches, clocks, watch cases, and parts                   | 7                                 |
| Dehydrated fruit  | 4                                 |
| Ceramic wall and floor tile                               | 1                                 |
| Glass and glass products                                  | 1                                 |

**Source:** *The Economic Effects of Significant U.S. Imports Restraints, Sixth Update* (U.S. International Trade Commission, Washington, D.C., 2009), <http://www.usitc.gov/publications/332/pub4094.pdf>.

Tables 1 and 2 demonstrate the very high cost per job saved by protection. If the costs to consumers are greater than the benefits to the protected industries, you may wonder why government provides any protection aimed at saving jobs. The answer, in a word, is politics. Protection of the U.S. textile and sugar industries means that all consumers pay a higher price for clothing and sugar. But individual consumers do not know how much of the price they pay for clothes and sugar is due to protection, and consumers rarely lobby their political representatives to eliminate protection and reduce prices. Meanwhile, there is a great deal of pressure for protection. Employers and workers in the protected industries know the benefits of protection: higher prices for their output, higher profits for owners, and higher wages for workers. As a result, there will be active lobbying for protection against foreign competition.

### 1.b. Creation of a “Level Playing Field”

Special interest groups sometimes claim that other nations that export successfully to the home market have unfair advantages over domestic producers. Fairness, however, is often in the eye of the beholder. People who call for creating a “level playing field” believe that the domestic government should take steps to offset the perceived advantage of the foreign firm. They often claim that foreign firms have an unfair advantage because foreign workers are willing to work for very low wages. “Fair trade, not free trade” is the cry that this claim generates. But advocates of fair trade are really claiming that



*Calls for “fair trade” are typically aimed at imposing restrictions to match those imposed by other nations.*

production in accordance with comparative advantage is unfair. This is clearly wrong. A country with relatively low wages is typically a country with an abundance of low-skilled labor. Such a country will have a comparative advantage in products that use low-skilled labor most intensively. To create a “level playing field” by imposing restrictions that eliminate the comparative advantage of foreign firms will make domestic consumers worse off and undermine the basis for specialization and economic efficiency.

Some calls for “fair trade” are based on the notion of reciprocity. If a country imposes import restrictions on goods from a country that does not have similar restrictions, reciprocal tariffs and quotas may be called for in the latter country in order to stimulate a reduction of trade restrictions in the former country. For instance, it has been claimed that U.S. construction firms are discriminated against in Japan, because Japanese construction firms do billions of dollars’ worth of business in the United States each year, but U.S. construction companies rarely are seen in Japan. Advocates of fair trade could argue that U.S. restrictions should be imposed on Japanese construction firms.

One danger of calls for fairness based on reciprocity is that calls for fair trade may be invoked in cases where, in fact, foreign restrictions on U.S. imports do not exist. For instance, suppose the U.S. auto industry wanted to restrict the entry of imported autos to help stimulate sales of domestically produced cars. One strategy might be to point out that U.S. auto sales abroad had fallen and to claim that this was due to unfair treatment of U.S. auto exports in other countries. Of course, there are many other possible reasons why foreign sales of U.S. autos might have fallen. But blaming foreign trade restrictions might win political support for restricting imports of foreign cars into the United States.

### 1.c. Government Revenue Creation

Tariffs on trade generate government revenue. Industrial countries, which find income taxes easy to collect, rarely justify tariffs on the basis of the revenue they generate for government spending. But many developing countries find income taxes difficult to levy and collect, whereas tariffs are easy to collect. Customs agents can be positioned at ports of entry to examine all goods that enter and leave the country. The observability of trade flows makes tariffs a popular tax in developing countries, whose revenue requirements may provide a valid justification for their existence. Table 3 shows that tariffs account for a relatively large fraction of government revenue in many developing countries, and only a small fraction in industrial countries.

*Developing countries often justify tariffs as an important source of government revenue.*

### 1.d. National Defense

It has long been argued that industries that are crucial to the national defense, such as shipbuilding, should be protected from foreign competition. Even though the United States does not have a comparative advantage in shipbuilding, the argument goes, a domestic shipbuilding industry is necessary, since foreign-made ships may not be available during war. This is a valid argument as long as the protected industry is genuinely critical to the national defense. In some industries, such as copper or other basic metals, it might make more sense to import the crucial products during peacetime and store them for use in the event of war; these products do not require domestic production in order to be useful. Care must be taken to ensure that the national defense argument is not used to protect industries other than those that are truly crucial to the nation’s defense.

*Industries that are truly critical to the national defense should be protected from foreign competition if that is the only way to ensure their existence.*

### 1.e. Infant Industries

Nations are often inclined to protect new industries on the basis that the protection will give those industries adequate time to develop. New industries need time to establish themselves and to become efficient enough that their costs are no higher than those of

**TABLE 3** Tariffs as a Percentage of Total Government Revenue

| Country        | Tariffs as Percentage of Government Revenue |
|----------------|---|
| European Union | 14.12%                                      |
| United States  | 1.7%  |
| Canada         | 1.7%  |
| Mexico         | 2.0%  |
| China          | 5.8%  |
| Korea          | 4.6%  |
| India          | 18.0%                                       |
| Jordan         | 10.4%                                       |
| Lesotho        | 64.0%                                       |

**Source:** World Customs Organization, "Annual Survey to Determine Percentage of National Revenues Represented by Customs Duties, 2010," [http://www.wcoomd.org/files/1.%20Public%20files/PDFandDocuments/HarmonizedSystem/HS%20Overview/Duty%20Survey%20Jan2010\\_E.pdf](http://www.wcoomd.org/files/1.%20Public%20files/PDFandDocuments/HarmonizedSystem/HS%20Overview/Duty%20Survey%20Jan2010_E.pdf).

their foreign rivals. An alternative to protecting young and/or critical domestic industries with tariffs and quotas is to subsidize them. Subsidies allow such firms to charge lower prices and to compete with more-efficient foreign producers, while permitting consumers to pay the world price rather than the higher prices associated with tariffs or quotas on foreign goods.

Protecting an infant industry from foreign competition may make sense, but only until the industry matures. Once the industry achieves sufficient size, protection should be withdrawn, and the industry should be made to compete with its foreign counterparts. Unfortunately, such protection is rarely withdrawn, because the larger and more successful the industry becomes, the more political power it wields. In fact, if an infant industry truly has a good chance to become competitive and produce profitably once it is well established, it is not at all clear that government should even offer protection to reduce short-run losses. New firms typically incur losses, but they are only temporary if the firm is successful.

*Countries sometimes justify protecting new industries that need time to become competitive with the rest of the world.*

## 1.f. Strategic Trade Policy

There is another view of international trade that regards the description of comparative advantage presented in the previous chapter as misleading. According to this outlook, called **strategic trade policy**, international trade largely involves firms that pursue economies of scale—that is, firms that achieve lower costs per unit of production the more they produce. In contrast to the constant opportunity costs illustrated in the example of wheat and cloth in the chapter “World Trade Equilibrium,” opportunity costs in some industries may fall with the level of output. Such **increasing-returns-to-scale industries** will tend to concentrate production in the hands of a few very large firms, rather than many competitive firms. Proponents of strategic trade policy contend that government can use tariffs or subsidies to give domestic firms with decreasing costs an advantage over their foreign rivals.

A monopoly exists when there is only one producer in an industry and no close substitutes for the product exist. If the average costs of production decline with increases in output, then the larger a firm is, the lower its per unit costs will be. One large producer will be more efficient than many small ones. A simple example of a natural-monopoly industry

### strategic trade policy

The use of trade restrictions or subsidies to allow domestic firms with decreasing costs to gain a greater share of the world market.

### increasing-returns-to-scale industry

An industry in which the costs of producing a unit of output fall as more output is produced.



*Government can use trade policy as a strategy to stimulate production by a domestic industry that is capable of achieving increasing returns to scale.*

will indicate how strategic trade policy can make a country better off. Suppose that the production of buses is an industry characterized by increasing returns to scale and that there are only two firms capable of producing buses: Volkswagen in Germany and Ford in the United States. If both firms produce buses, their costs will be so high that both will experience losses. If only one of the two produces buses, however, it will be able to sell buses both at home and abroad, creating a level of output that allows the firm to earn a profit.

Assume further that a monopoly producer will earn \$100 million and that if both firms produce, they will each lose \$5 million. Obviously, a firm that doesn't produce earns nothing. Which firm will produce? Because of the decreasing-cost nature of the industry, the firm that is the first to produce will realize lower costs and be able to prevent the other firm from entering the market. But strategic trade policy can alter the market in favor of the domestic firm.

Suppose Volkswagen is the world's only producer of buses. Ford does not produce them. The U.S. government could offer Ford an \$8 million subsidy to produce buses. Ford would then enter the bus market, since the \$8 million subsidy would more than offset the \$5 million loss it would suffer by entering the market. Volkswagen would sustain losses of \$5 million once Ford entered. Ultimately, Volkswagen would stop producing buses to avoid the loss, and Ford would have the entire market and earn \$100 million plus the subsidy.

Strategic trade policy is aimed at offsetting the increasing-returns-to-scale advantage enjoyed by foreign producers and at stimulating production in domestic industries that are capable of realizing decreasing costs. One practical problem for government is the need to understand the technology of different industries and to forecast accurately the subsidy needed to induce domestic firms to produce new products. A second problem is the likelihood of retaliation by the foreign government. If the U.S. government subsidizes Ford in its attack on the bus market, the German government is likely to subsidize Volkswagen rather than lose the entire bus market to a U.S. producer. As a result, taxpayers in both nations will be subsidizing two firms, each producing too few buses to earn a profit.

## RECAP

1. Government restrictions on foreign trade are usually aimed at protecting domestic producers from foreign competition.
2. Import restrictions may save domestic jobs, but the costs to consumers may be greater than the benefits to those who retain their jobs.
3. Advocates of "fair trade," or the creation of a "level playing field," call for import restrictions as a means of lowering foreign restrictions on markets for domestic exports.
4. Tariffs are an important source of revenue in many developing countries.
5. The national-defense argument in favor of trade restrictions is that protection from foreign competition is necessary to ensure that certain key defense-related industries continue to produce.
6. The infant-industries argument in favor of trade restriction is to allow a new industry a period of time in which to become competitive with its foreign counterparts.
7. Strategic trade policy is intended to provide domestic increasing-returns-to-scale industries with an advantage over their foreign competitors.



- 2** How do countries restrict the entry of foreign goods and promote the export of domestic goods?

## 2. Tools of Commercial Policy

Commercial policy makes use of several tools, including tariffs, quotas, subsidies, and nontariff barriers like health and safety regulations that restrict the entry of foreign products. Since 1945, barriers to trade have been reduced. Much of the progress toward free trade may be linked to the *General Agreement on Tariffs and Trade*, or GATT, which



## GLOBAL BUSINESS INSIGHT



### Smoot-Hawley Tariff

Many economists believe that the Great Depression of the 1930s was at least partly due to the Smoot-Hawley Tariff Act, signed into law by President Herbert Hoover in 1930. Hoover had promised that, if elected, he would increase tariffs on agricultural products to raise U.S. farm income. Congress began work on the tariff increases in 1928. Congressman Willis Hawley and Senator Reed Smoot conducted the hearings.

In testimony before Congress, manufacturers and other special interest groups also sought protection from foreign competition. The resulting bill increased tariffs on over 12,000 products. Tariffs reached their highest levels ever, about 60 percent of average import values. Only twice before in U.S. history had tariffs approached the levels of the Smoot-Hawley era.

Before President Hoover signed the bill, 38 foreign governments made formal protests, warning that they would retaliate with high tariffs on U.S. products. A petition signed by 1,028 economists warned of the harmful effects of the bill. Nevertheless, Hoover signed the bill into law.

World trade collapsed as other countries raised their tariffs in response. Between 1930 and 1931, U.S. imports fell 29 percent, but U.S. exports fell 33 percent. By 1933, world trade was about one-third of its 1929 level. As the level of trade fell, so did income and prices. In 1934, in an effort to correct the mistakes of Smoot-Hawley, Congress passed the Reciprocal Trade Agreements Act, which allowed the president to lower U.S. tariffs in return for reductions in foreign tariffs on U.S. goods. This act ushered in the modern era of relatively low tariffs. In the United States today, tariffs are about 5 percent of the average value of imports.

Many economists believe that the collapse of world trade and the Depression were linked by a decrease in real income caused by abandoning production based on comparative advantage. Few economists argue that the Great Depression was caused solely by the Smoot-Hawley tariff, but the experience serves as a lesson to those who support higher tariffs to protect domestic producers.

began in 1947. In 1995, the *World Trade Organization (WTO)* was formed to incorporate the agreements under GATT into a formal permanent international organization to oversee world trade. The WTO has three objectives: to help global trade flow as freely as possible, to achieve reductions in trade restrictions gradually through negotiation, and to provide an impartial means of settling disputes. Nevertheless, restrictions on trade still exist, and this section will review the most commonly used restrictions.

### 2.a. Tariffs

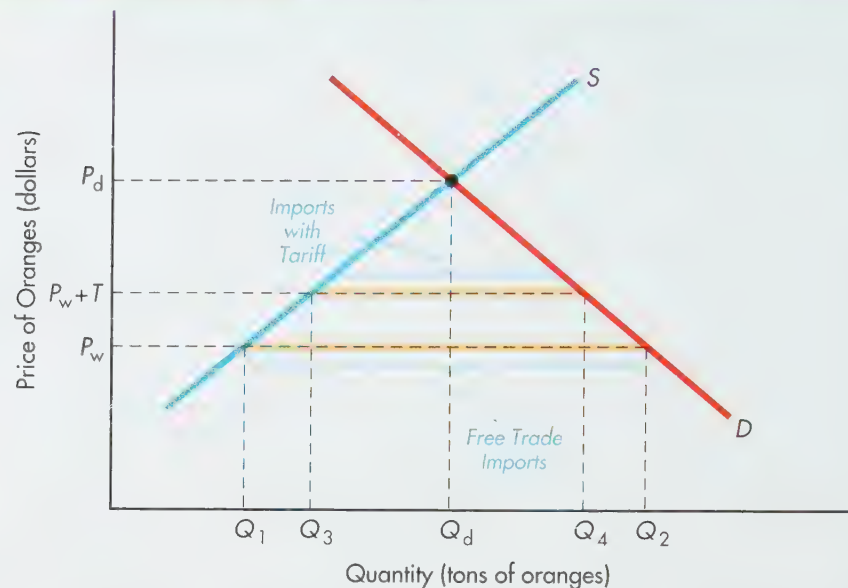
A **tariff** is a tax on imports or exports. Every country imposes tariffs on at least some imports. Some countries also impose tariffs on selected exports as a means of raising government revenue. Brazil, for instance, taxes coffee exports. The United States does not employ export tariffs, which are forbidden by the U.S. Constitution.

Tariffs are frequently imposed in order to protect domestic producers from foreign competition. The dangers of imposing tariffs are well illustrated in the Global Business Insight “Smoot-Hawley Tariff.” The effect of a tariff is illustrated in Figure 1, which shows the domestic market for oranges. Without international trade, the domestic equilibrium price,  $P_d$ , and the quantity demanded,  $Q_d$ , are determined by the intersection of the domestic demand and supply curves. If the world price of oranges,  $P_w$ , is lower than the domestic equilibrium price, this country will import oranges. The quantity imported will be the difference between the quantity  $Q_1$  produced domestically at a price of  $P_w$  and the quantity  $Q_2$  demanded domestically at the world price of oranges.

When the world price of the traded good is lower than the domestic equilibrium price without international trade, free trade causes domestic production to fall and domestic

#### **tariff**

A tax on imports or exports.

**FIGURE 1** The Effects of a Tariff

The domestic equilibrium price and quantity with no trade are  $P_d$  and  $Q_d$ , respectively. The world price is  $P_w$ . With free trade, therefore, imports will equal  $Q_2 - Q_1$ . A tariff added to the world price reduces imports to  $Q_4 - Q_3$ .

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consumption to rise. The domestic shortage at the world price is met by imports. Domestic consumers are better off, since they can buy more at a lower price. But domestic producers are worse off, since they now sell fewer oranges and receive a lower price.

Suppose a tariff of  $T$  (the dollar value of the tariff) is imposed on orange imports. The price paid by consumers is now  $P_w + T$ , rather than  $P_w$ . At this higher price, domestic producers will produce  $Q_3$  and domestic consumers will purchase  $Q_4$ . The tariff has the effect of increasing domestic production and reducing domestic consumption, relative to the free trade equilibrium. Imports fall accordingly, from  $Q_2 - Q_1$  to  $Q_4 - Q_3$ .

Domestic producers are better off, since the tariff has increased their sales of oranges and raised the price they receive. Domestic consumers pay higher prices for fewer oranges than they would with free trade, but they are still better off than they would be without trade. If the tariff had raised the price paid by consumers to  $P_d$ , there would be no trade, and the domestic equilibrium quantity,  $Q_d$ , would prevail.

The government earns revenue from imports of oranges. If each ton of oranges generates tariff revenue of  $T$ , the total tariff revenue to the government is found by multiplying the tariff by the quantity of oranges imported. In Figure 1, this amount is  $T \times (Q_4 - Q_3)$ . As the tariff changes, so do the quantity of imports and the government revenue.

## 2.b. Quotas

### quantity quota

A limit on the amount of a good that may be imported.

Quotas are limits on the quantity or value of goods imported and exported. A **quantity quota** restricts the physical amount of a good. For instance, for 2009, the United States allowed only 1.1 million tons of sugar to be imported. Even though the United States is not a competitive sugar producer compared to other nations like the Dominican Republic or Cuba, the quota allows U.S. firms to produce about 80 percent of the sugar

consumed in the United States. A **value quota** restricts the monetary value of a good that may be traded. Instead of a physical quota on sugar, the United States could have limited the dollar value of sugar imports.

### value quota

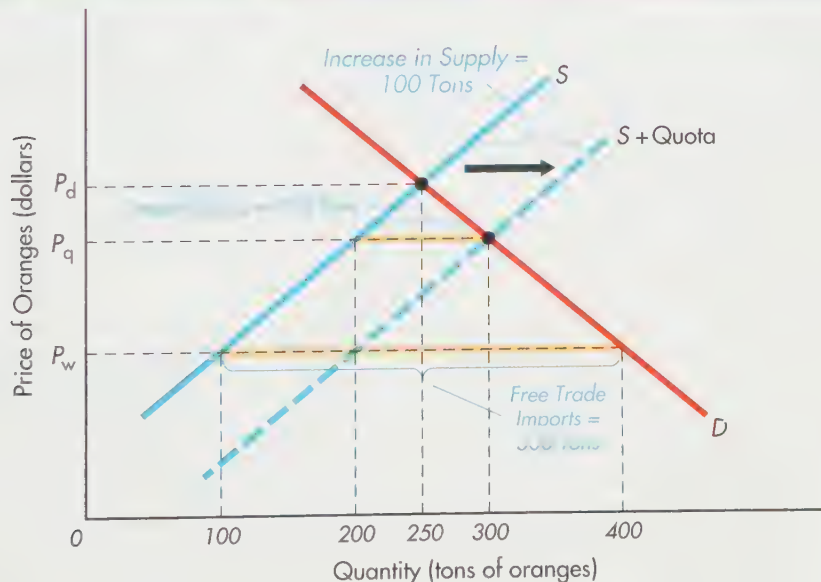
A limit on the monetary value of a good that may be imported.

Quotas are used to protect domestic producers from foreign competition. By restricting the amount of a good that may be imported, they increase the price of that good and allow domestic producers to sell more at a higher price than they would with free trade. For example, one effect of the U.S. sugar quota is a higher sugar price for U.S. consumers. In the fourth quarter of 2010, the world price of sugar was \$0.2952 per pound, but the U.S. price was about 32 percent higher at \$0.3883 per pound. Beyond the obvious effect on sugar production and consumption in the United States, there are spillover effects in related industries, such as candy manufacturing. The high price of sugar in the United States has resulted in candy manufacturers moving jobs to other countries, like Canada, where the price of sugar is about half the U.S. price. The lesson is that one must think about the total effects of trade restrictions on the economy when evaluating costs and benefits.

Figure 2 illustrates the effect of a quota on the domestic orange market. The domestic equilibrium supply and demand curves determine that the equilibrium price and quantity without trade are  $P_d$  and 250 tons, respectively. The world price of oranges is  $P_w$ . Since  $P_w$  lies below  $P_d$ , this country will import oranges. The quantity of imports is equal to the amount of the domestic shortage at  $P_w$ . The quantity demanded at  $P_w$  is 400 tons, and the quantity supplied domestically at  $P_w$  is 100 tons, so imports will equal 300 tons of oranges. With free trade, domestic producers sell 100 tons at a price of  $P_w$ .

But suppose domestic orange growers convince the government to restrict orange imports. The government then imposes a quota of 100 tons on imported oranges. The effect of the quota on consumers is to shift the supply curve to the right by the amount

**FIGURE 2** The Effects of a Quota



The domestic equilibrium price with no international trade is  $P_d$ . At this price, 250 tons of oranges would be produced and consumed at home. With free trade, the price is  $P_w$ , and 300 tons will be imported. An import quota of 100 tons will cause the price to be  $P_q$ , where the domestic shortage equals the 100 tons allowed by the quota.



of the quota, 100 tons. Since the quota is less than the quantity of imports with free trade, the quantity of imports will equal the quota. The domestic equilibrium price with the quota occurs at the point where the domestic shortage equals the quota. At price  $P_q$ , the domestic quantity demanded (300 tons) is 100 tons more than the domestic quantity supplied (200 tons).

Quotas benefit domestic producers in the same way that tariffs do. Domestic producers receive a higher price ( $P_q$  instead of  $P_w$ ) for a greater quantity (200 instead of 100) than they do under free trade. The effect on domestic consumers is also similar to that of a tariff: They pay a higher price for a smaller quantity than they would with free trade. A tariff generates government tax revenue; a quota does not (unless the government auctions off the right to import under the quota). Furthermore, a tariff raises the price of the product only in the domestic market. Foreign producers receive the world price,  $P_w$ . With a quota, both domestic and foreign producers receive the higher price,  $P_q$ , for the goods sold in the domestic market. So foreign producers are hurt by the reduction in the quantity of imports permitted, but they receive a higher price for the amount that they do sell.

## 2.c. Other Barriers to Trade

Tariffs and quotas are not the only barriers to the free flow of goods across international borders. There are three additional sources of restrictions on free trade: subsidies, government procurement, and health and safety standards. Though these practices are often entered into for reasons other than protection from foreign competition, a careful analysis reveals their import-reducing effect.

Before discussing these three types of barriers, let us note the cultural or institutional barriers to trade that also exist in many countries. Such barriers may exist independently of any conscious government policy. For instance, Japan has frequently been criticized by U.S. officials for informal business practices that discriminate against foreigners. Under the Japanese distribution system, goods typically pass through several layers of middlemen before appearing in a retail store. A foreign firm faces the difficult task of gaining entry to this system to supply goods to the retailer. Furthermore, a foreigner cannot easily open a retail store. Japanese law requires a new retail firm to receive permission from other retailers in the area in order to open a business. A firm that lacks contacts and knowledge of the system cannot penetrate the Japanese market.

The economic stimulus bill that the U.S. Congress passed in February 2009 included a “buy American” provision requiring that any steel or manufactured goods bought with federal government funds must be made in the United States. Many U.S. trade partners expressed concerns over the protectionist aspects of this policy. Such inward-looking policies in response to the financial crisis were not confined just to the United States. The level of international trade fell during the crisis and there was a fear that if many countries tried to stimulate their domestic economies at the expense of other nations, trade would not recover once the crisis passed.

### export subsidies

Payments made by a government to domestic firms to encourage exports.

**2.c.1. Export Subsidies** Export subsidies are payments by a government to an exporter. These subsidies are paid in order to stimulate exports by allowing the exporter to charge a lower price. The amount of a subsidy is determined by the international price of a product relative to the domestic price in the absence of trade. Domestic consumers are harmed by subsidies in that their taxes finance the subsidies. Also, since the subsidy diverts resources from the domestic market toward export production, the increase in the supply of export goods could be associated with a decrease in the supply of domestic goods, causing domestic prices to rise.

Subsidies may take forms other than direct cash payments. These include tax reductions, low-interest loans, low-cost insurance, government-sponsored research funding,

and other devices. The U.S. government subsidizes export activity through the U.S. Export-Import Bank, which provides loans and insurance to help U.S. exporters sell their goods to foreign buyers. Subsidies are more common in Europe than in Japan or the United States.

**2.c.2. Government Procurement** Governments are often required by law to buy only from local producers. In the United States, a “buy American” act passed in 1933 required U.S. government agencies to buy U.S. goods and services unless the domestic price was more than 12 percent above the foreign price. This kind of policy allows domestic firms to charge the government a higher price for their products than they charge consumers; the taxpayers bear the burden. The United States is by no means alone in the use of such policies. Many other nations also use such policies to create larger markets for domestic goods. The World Trade Organization has a standing committee working to reduce discrimination against foreign producers and open government procurement practices to global competition.

**2.c.3. Health and Safety Standards** Government serves as a guardian of the public health and welfare by requiring that products offered to the public be safe and fulfill the use for which they are intended. Government standards for products sold in the domestic marketplace can have the effect (intentional or not) of protecting domestic producers from foreign competition. These effects should be considered in evaluating the full impact of such standards.

As mentioned in the Preview, the government of Japan once threatened to prohibit foreign-made snow skis from entering the country for reasons of safety. Only Japanese-made skis were determined to be suitable for Japanese snow. The government of Japan certifies auto parts that are safe for use by repair shops. U.S.-manufactured parts are not certified for use, so U.S. parts manufacturers are excluded from the Japanese market. Several western European nations once announced that U.S. beef would not be allowed into Europe because the U.S. government had approved the feeding of hormones to U.S. beef cattle. In the late 1960s, France required tractors sold there to have a maximum speed of 17 miles per hour; in Germany, the permissible speed was 13 miles per hour, and in the Netherlands, it was 10 miles per hour. Tractors produced in one country had to be modified to meet the requirements of the other countries. Such modifications raise the price of goods and discourage international trade.

Product standards may not eliminate foreign competition, but standards different from those of the rest of the world do provide an element of protection to domestic firms.

## RECAP

1. The World Trade Organization works to achieve reductions in trade barriers.
2. A tariff is a tax on imports or exports. Tariffs protect domestic firms by raising the prices of foreign goods.
3. Quotas are government-imposed limits on the quantity or value of an imported good. Quotas protect domestic firms by restricting the entry of foreign products to a level less than the quantity demanded.
4. Subsidies are payments by the government to domestic producers. Subsidies lower the price of domestic goods to foreign buyers.
5. Governments are often required by law to buy only domestic products.
6. Health and safety standards can also be used to protect domestic firms.





- 3** What sorts of agreements do countries enter into to reduce barriers to international trade?

#### free trade area

An organization of nations whose members have no trade barriers among themselves but are free to fashion their own trade policies toward nonmembers.

#### customs union

An organization of nations whose members have no trade barriers among themselves but impose common trade barriers on nonmembers.

## 3. Preferential Trade Agreements

In an effort to stimulate international trade, groups of countries sometimes enter into agreements to abolish most barriers to trade among themselves. Such arrangements between countries are known as preferential trading agreements. The European Union and the North American Free Trade Agreement (NAFTA) are examples of preferential trading agreements.

### 3.a. Free Trade Areas and Customs Unions

Two common forms of preferential trade agreements are **free trade areas** (FTAs) and **customs unions** (CUs). These two approaches differ with regard to the treatment of countries outside the agreement. In an FTA, member countries eliminate trade barriers among themselves, but each member country chooses its own trade policies toward non-member countries. Members of a CU agree to both eliminate trade barriers among themselves and maintain common trade barriers against nonmembers.

The best-known CU is the European Union (EU), formerly known as the European Community and still earlier as the European Economic Community (EEC), created in 1957 by France, West Germany, Italy, Belgium, the Netherlands, and Luxembourg. The United Kingdom, Ireland, and Denmark joined in 1973, followed by Greece in 1981 and Spain and Portugal in 1986. In 1992 the EEC was replaced by the EU with an agreement to create a single market for goods and services in western Europe. On May 1, 2004, 10 new members were admitted to the EU: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia. In 2007, Bulgaria and Romania were admitted to the EU. Turkey is negotiating to be included in future enlargements of the EU. In addition to free trade in goods, European financial markets and institutions will eventually be able to operate across national boundaries. For instance, a bank in any EU country will be permitted to operate in any or all other EU countries.



The North American Free Trade Agreement stimulates trade among Mexico, Canada, and the United States. The act results in more container ships from Mexico unloading their cargo at U.S. docks. Similarly, freight from Canada and the United States will increase in volume at Mexican ports.



In 1989, the United States and Canada negotiated a free trade area. The United States, Canada, and Mexico negotiated a free trade area in 1992 that became effective on January 1, 1994. The North American Free Trade Agreement (NAFTA) lowered tariffs on 8,000 different items and opened each nation's financial market to competition from institutions in the other two nations. NAFTA does not eliminate all barriers to trade among the three nations, but it is a significant step in that direction.

### 3.b. Trade Creation and Trade Diversion

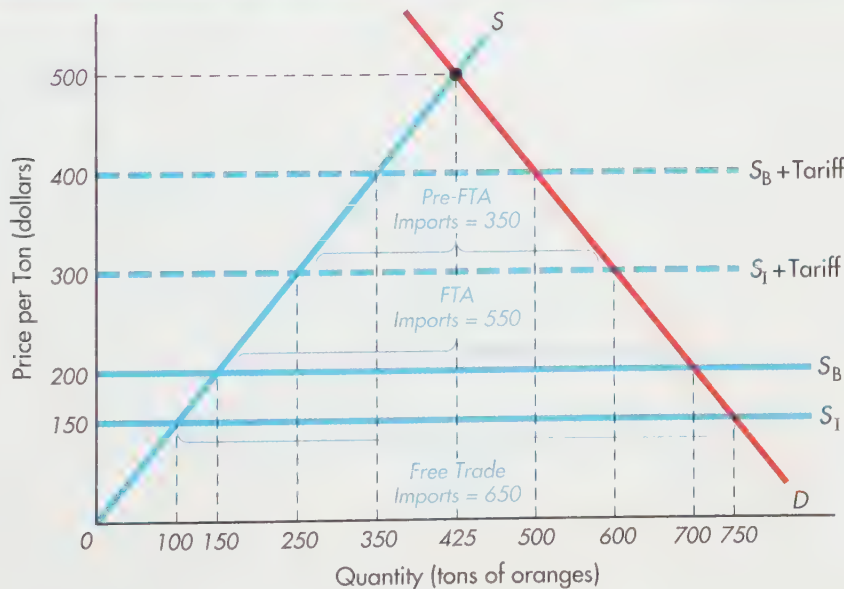
Free trade agreements provide for free trade among a group of countries, not worldwide. As a result, a customs union or free trade area may make a nation better off or worse off compared to the free trade equilibrium.

Figure 3 illustrates the effect of a free trade area. With no international trade, the U.S. supply and demand curves for oranges would result in an equilibrium price of \$500 per ton and an equilibrium quantity of 425 tons. Suppose there are two other orange-producing countries, Israel and Brazil. Israel, the low-cost producer of oranges, is willing to sell all the oranges the United States can buy for \$150 per ton, as represented by the horizontal supply curve  $S_I$ . Brazil will supply oranges for a price of \$200 per ton, as represented by the horizontal supply curve  $S_B$ .

With free trade, the United States would import oranges from Israel. The quantity demanded at \$150 is 750 tons, and the domestic quantity supplied at this price is 100 tons. The shortage of 650 tons is met by imports from Israel.

Now suppose a 100 percent tariff is imposed on orange imports. The price that domestic consumers pay for foreign oranges is twice as high as before. For oranges

**FIGURE 3** Trade Creation and Trade Diversion with a Free Trade Area



With no trade, the domestic equilibrium price is \$500, and the equilibrium quantity is 425 tons. With free trade, the price is \$150, and 650 tons would be imported, as indicated by the supply curve for Israel,  $S_I$ . A 100 percent tariff on imports would result in imports of 350 tons from Israel, according to the supply curve  $S_I + \text{Tariff}$ . A free trade agreement that eliminates tariffs on Brazilian oranges only would result in a new equilibrium price of \$200 and imports of 550 tons from Brazil, according to supply curve  $S_B$ .

from Israel, the new price is \$300, twice the old price of \$150. The new supply curve for Israel is represented as  $S_I + \text{Tariff}$ . Oranges from Brazil now sell for \$400, twice the old price of \$200; the new supply curve for Brazil is shown as  $S_B + \text{Tariff}$ . After the 100 percent tariff is imposed, oranges are still imported from Israel. But at the new price of \$300, the domestic quantity demanded is 600 tons, and the domestic quantity supplied is 250 tons. Thus, only 350 tons will be imported. The tariff reduces the volume of trade relative to the free trade equilibrium, at which 650 tons were imported.

Now suppose that the United States negotiates a free trade agreement with Brazil, eliminating tariffs on imports from Brazil. Israel is not a member of the free trade agreement, so imports from Israel are still covered by the 100 percent tariff. The relevant supply curve for Brazil is now  $S_B$ , so oranges may be imported from Brazil for \$200, a lower price than Israel's price including the tariff. At a price of \$200, the domestic quantity demanded is 700 tons and the domestic quantity supplied is 150 tons; 550 tons will be imported.

The effects of the free trade agreement are twofold. First, trade is diverted away from the lowest-cost producer, Israel, to the FTA partner, Brazil. This **trade-diversion** effect of an FTA reduces worldwide economic efficiency, since production is diverted from the country with the comparative advantage. Oranges are not being produced as efficiently as possible. The other effect of the FTA is that the quantity of imports increases relative to the effect of a tariff applicable to all imports. Imports rise from 350 tons (the quantity imported from Israel with the tariff) to 550 tons. The FTA thus has a **trade-creation** effect as a result of the lower price that is available after the tariff reduction. Trade creation is a beneficial aspect of the FTA: The expansion of international trade allows this country to realize greater benefits from trade than would be possible without trade.

Countries form preferential trade agreements because they believe that FTAs will make each member country better off. The member countries view the trade creation effects of such agreements as benefiting their exporters by increasing exports to other member countries and as benefiting consumers by making a wider variety of goods available at a lower price. From the point of view of the world as a whole, preferential trade agreements are more desirable the more they stimulate trade creation to allow the benefits of trade to be realized and the less they emphasize trade diversion, so that production occurs on the basis of comparative advantage. This principle suggests that the most successful FTAs or CUs are those that increase trade volume but do not change the patterns of trade in terms of who specializes and exports each good. In the case of Figure 3, a more successful FTA would reduce tariffs on Israeli as well as Brazilian oranges, so that oranges would be imported from the lowest-cost producer, Israel.

### trade diversion

An effect of a preferential trade agreement that reduces economic efficiency by shifting production to a higher cost producer.

### trade creation

An effect of a preferential trade agreement that allows a country to obtain goods at a lower cost than is available at home.

## RECAP

1. Countries form preferential trade agreements in order to stimulate trade among themselves.
2. The most common forms of preferential trade agreement are free trade areas (FTAs) and customs unions (CUs).
3. Preferential trade agreements have a harmful trade-diversion effect when they cause production to shift from the nation with a comparative advantage to a higher-cost producer.
4. Preferential trade agreements have a beneficial trade-creation effect when they reduce prices for traded goods and stimulate the volume of international trade.

## SUMMARY

### 1. Why do countries restrict international trade?

- Commercial policy is government policy that influences the direction and volume of international trade. *Preview*
- Protecting domestic producers from foreign competition usually imposes costs on domestic consumers. §1
- Rationales for commercial policy include saving domestic jobs, creating a fair-trade relationship with other countries, raising tariff revenue, ensuring a domestic supply of key defense goods, allowing new industries a chance to become internationally competitive, and giving domestic industries with increasing returns to scale an advantage over foreign competitors. §1.a–1.f

### 2. How do countries restrict the entry of foreign goods and promote the export of domestic goods?

- Tariffs protect domestic industry by increasing the price of foreign goods. §2.a

- Quotas protect domestic industry by limiting the quantity of foreign goods allowed into the country. §2.b
- Subsidies allow relatively inefficient domestic producers to compete with foreign firms. §2.c.1
- Government procurement practices and health and safety regulations can protect domestic industry from foreign competition. §2.c.2, 2.c.3

### 3. What sorts of agreements do countries enter into to reduce barriers to international trade?

- Free trade areas and customs unions are two types of preferential trade agreements that reduce trade restrictions among member countries. §3.a
- Preferential trade agreements have harmful trade-diversion effects and beneficial trade-creation effects. §3.b

## KEY TERMS

commercial policy, 453  
 customs union, 464  
 export subsidies, 462  
 free trade area, 464

increasing-returns-to-scale  
 industries, 457  
 quantity quota, 460  
 strategic trade policy, 457

tariff, 459  
 trade creation, 466  
 trade diversion, 466  
 value quota, 461

## EXERCISES

1. What are the potential benefits and costs of a commercial policy designed to pursue each of the following goals?
  - a. Save domestic jobs
  - b. Create a level playing field
  - c. Increase government revenue
  - d. Provide a strong national defense
  - e. Protect an infant industry
  - f. Stimulate exports of an industry with increasing returns to scale
2. For each of the goals listed in exercise 1, discuss what the appropriate commercial policy is likely to be (in terms of tariffs, quotas, subsidies, etc.).
3. Tariffs and quotas both raise the price of foreign goods to domestic consumers. What is the difference between the effects of a tariff and the effects of a quota on the following?
  - a. The domestic government
  - b. Foreign producers
  - c. Domestic producers



4. Would trade-diversion and trade-creation effects occur if the whole world became a free trade area? Explain.
5. What is the difference between a customs union and a free trade area?
6. Draw a graph of the U.S. automobile market in which the domestic equilibrium price without trade is  $P_d$  and the equilibrium quantity is  $Q_d$ . Use this graph to illustrate and explain the effects of a tariff if the United States were an auto importer with free trade. Then use the graph to illustrate and explain the effects of a quota.
7. If commercial policy can benefit U.S. industry, why would any U.S. resident oppose such policies? Find two newspaper articles illustrating opposition to commercial policies and summarize their arguments.
8. Suppose you were asked to assess U.S. commercial policy to determine whether the benefits of protection for U.S. industries are worth the costs. Do Tables 1 and 2 provide all the information you need? If not, what else would you want to know?
9. How would the effects of international trade on the domestic orange market change if the world price of oranges were above the domestic equilibrium price? Draw a graph to help explain your answer.
10. Suppose the world price of kiwi fruit is \$25 per case and the U.S. equilibrium price with no international trade is \$40 per case. If the U.S. government had previously banned the import of kiwi fruit but then imposed a tariff of \$5 per case and allowed kiwi imports, what would happen to the equilibrium price and quantity of kiwi fruit consumed in the United States?
11. Think of an industry in your country (if you currently have a job, use that industry). What kind of nontariff barrier could you design that would keep out foreign competitors to the domestic industry? This should be something like a health or safety standard or some other criterion that a government could use as an excuse to protect the domestic industry from foreign competition.

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

# USDA INCREASES FY11 RAW SUGAR TARIFF-RATE QUOTA, DOMESTIC SUGAR OVERALL ALLOTMENT QUANTITY AND REASSIGNS DOMESTIC SUGAR ALLOTMENTS AND ALLOCATIONS

*United States Department of Agriculture News Release No. 0265.11, June 21, 2011*

**T**he U.S. Department of Agriculture today increased the fiscal year 2011 raw sugar tariff-rate quota (TRQ) by 120,000 short tons raw value (STRV\*). . . . In a separate action, USDA increased the overall allotment quantity (OAQ) for domestic sugar marketing by 164,750 STRV to provide U.S. producers with the statutory minimum market share of 85 percent. This OAQ action increased both cane and beet sugar allotments given the sector proportions specified in statute. The increased cane sugar allotment was greater than the domestic cane sugar supply. Thus, the surplus cane sugar allotment was reassigned from domestic sugarcane processors to raw sugar imports. This reassignment, as well as the enlarged beet sugar allotment, is effective June 21.

The individual company allocations that reflect the change in the OAQ are below. The Office of

the U.S. Trade Representative will announce country allocations for the TRQ increase separately.

## **FY 2011 Raw Sugar TRQ Increase**

On August 5, 2010, USDA established the FY 2011 TRQ for raw cane sugar at 1,231,497 STRV, the minimum to which the United States is committed under the World Trade Organization (WTO) Uruguay Round Agreement on Agriculture.

On April 12, 2011, USDA increased the raw cane sugar TRQ by 325,000 STRV to a total of 1,556,497 STRV. Pursuant to Additional U.S. Note 5 to Chapter 17 of the U.S. Harmonized Tariff Schedule (HTS) and Section 359k of the Agricultural Adjustment Act of 1938, as amended, USDA today announced in the Federal Register an increase in the raw sugar TRQ of 120,000 STRV, which brings the overall FY 2011 raw sugar TRQ to 1,676,497 STRV. . . .

## **FY 2011 Reassignment of Sugar Marketing Allotments**

USDA's Commodity Credit Corporation (CCC) latest review of domestic demand indicated that the OAQ had to be increased to provide domestic processors with the minimum 85 percent domestic market share, as required by the 2008 farm bill. This increase helps some beet sugar processors, who had inadequate allocations, to market all their supplies. Thus, the beet sector allotment was increased by 89,542 STRV to 5,108,900 STRV and redistributed from beet processors with surplus allocation to those with deficit allocation to release all blocked beet sugar stocks for sale. . . .

The 2008 farm bill requires that any OAQ increase be implemented in fixed proportions between the beet and cane sectors. Thus, the OAQ increase resulted in a 75,208 STRV increase in the cane sugar allotment, which

was distributed among the sugar cane states and processors. The resulting CCC estimate of a 600,000 STRV cane sugar allotment surplus must be reassigned to raw sugar imports. Here, 480,000 STRV is reassigned to Mexico raw sugar imports already anticipated, while 120,000 STRV is reassigned to the TRQ increase announced above.

All sugarcane states' sugar marketing allotments are reduced, with the total cane sector allotment decreased from 3,890,892 STRV to 3,366,100 STRV. The new cane state allotments are: Florida, 1,464,666 STRV; Louisiana, 1,526,050 STRV; Texas, 147,138 STRV; and Hawaii, 228,246 STRV. The FY 2011 sugar marketing allotment pro-

gram will allow all domestic supply to be marketed.

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\*Conversion factor: 1 metric ton = 1.10231125 short tons.

**Source:** Article online at <http://www.usda.gov/wps/portal/usda/usdahome?contentid=2011/06/0265.xml&contentidonly=true>



This article illustrates some important differences between free and restricted trade. In certain markets, such as the sugar market, domestic firms may seek protection, in the form of quotas or tariffs, from international competition. This is not a unique situation; it is a familiar story worldwide as firms that are threatened with foreign competition seek government protection from that competition. The protectionist measure of imposing quotas or tariffs on imports saves jobs in the domestic import-competing industries, but at a great cost to consumers and, sometimes, to other producers.

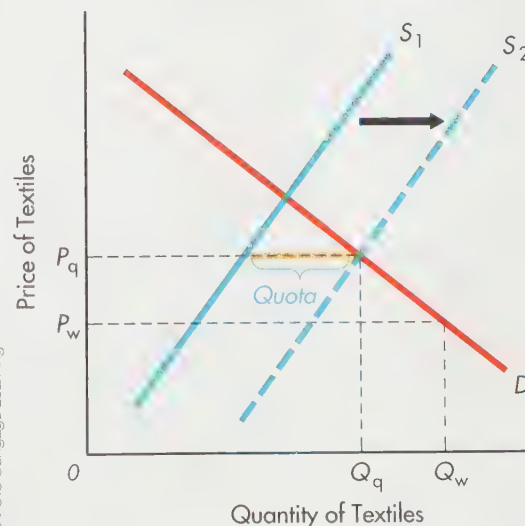
Recall that in our supply and demand models, the market clears at a price for which quantity supplied is equal to quantity demanded. Did you notice phrases in the press release like “allow all domestic supply to be marketed” or “redistributed from beet processors with surplus allocation to those with deficit allocation”? These and other mentions of reassignment and reallocation illustrate how trade restrictions complicate the market-equilibrating mechanisms and introduce a need for outside planning that is unnecessary in a free market. Even trade restrictions that are imposed for the sake of “fairness,” like the requirement that allotment increases be implemented in fixed proportions between the beet and cane sectors, introduce distortions.

The effect of reducing domestic competition with quotas can be understood using supply and demand analysis. Let’s analyze the case of quotas on textile imports into the United States. In the diagram,  $S_1$  is the domestic supply of textiles,  $S_2$  is the sum of the domestic supply and the foreign supply allowed in by the quotas, and  $D$  is the demand for textiles. Under the quota system, the price of textiles in the United States is represented by  $P_q$ , and the quantity of textiles consumed is  $Q_q$ . If the quotas were removed, the price of textiles in the United States would equal the world price of  $P_w$ , and this lower price would be associated with an increase in the consumption of textiles to  $Q_w$ . The quota represents a cost to society in terms of both a loss of

consumer welfare and a loss from the inefficient use of resources in an industry in which this country has no comparative advantage, just as Maine has no comparative advantage in the production of pineapples.

Given the costs to society of these quotas, why is there such strong support for them in Congress? An important political aspect of protectionist policies is that their benefits are concentrated among a relatively small number of people—in the case of the article, sugar beet and sugar cane growers—while their costs are diffused and spread across all consumers. Each individual import-competing producer faces very large losses from free trade, whereas the cost of a protectionist policy for each consumer is less dramatic. It is also easier to organize a relatively small number of manufacturers than to mobilize a vast population of consumers. These factors explain the strong lobby for the protection of industries like textiles and the absence of a legislative lobby that operates specifically in the interest of textile consumers.

Industrial arguments for trade protection should be seen for what they are: an attempt by an industry to increase its profits at the expense of the general public.



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# Exchange Rates and Financial Links between Countries



## FUNDAMENTAL QUESTIONS

- 1 How does a commodity standard fix exchange rates between countries?
- 2 What kinds of exchange-rate arrangements exist today?
- 3 How is equilibrium determined in the foreign exchange market?
- 4 How do fixed and floating exchange rates differ in their adjustment to shifts in supply and demand for currencies?
- 5 What are the advantages and disadvantages of fixed and floating exchange rates?
- 6 How does a change in the exchange rate affect the prices of goods traded between countries?
- 7 Why don't similar goods sell for the same price all over the world?
- 8 How do we find the domestic currency return on a foreign bond?
- 9 What is the relationship between domestic and foreign interest rates and changes in the exchange rate?



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An exchange rate is the link between two nations' monies. The value of a U.S. dollar in terms of Japanese yen or European euros determines how many dollars a U.S. resident will need in order to buy goods that are priced in yen or euros. Thus, changes in exchange rates can have far-reaching implications. Exchange rates may be determined in free markets, through government intervention in the foreign exchange market, or even by law.

In June 2007, one U.S. dollar was worth about 122 Japanese yen. By June 2011, the dollar was worth 81 yen, a 33 percent depreciation of the dollar against the yen. Why does the dollar fluctuate in value relative to the yen? What are the effects of such changes? Should governments permit exchange rates to change? What can



governments do to discourage changes in exchange rates? These are all important questions, and this chapter will help answer them.

The chapter begins with a review of the history of exchange-rate systems. It follows with an overview of

exchange-rate practices in the world today, and how exchange rates provide a link between prices and interest rates across countries. Along the way, it introduces terminology and institutions that play a major role in the evolution of exchange rates.

## 1. Past and Current Exchange-Rate Arrangements

### 1.a. The Gold Standard

In ancient times, government-produced monies were made of precious metals such as gold. Later, when governments began to issue paper money, that money was usually convertible into a fixed amount of gold. Ensuring the convertibility of paper money into gold was a way to maintain confidence in the currency's value, both at home and abroad. If a unit of currency was worth a fixed amount of gold, its value could be stated in terms of its gold value. The countries that maintained a constant gold value for their currencies were said to be on a **gold standard**.

Some countries had backed their currencies with gold long before 1880; however, the practice became widespread around 1880, so economists typically date the beginning of the gold standard to this period. From roughly 1880 to 1914, currencies had fixed values in terms of gold. For instance, the U.S. dollar's value was fixed at \$20.67 per ounce of gold. Any other currency that was fixed in terms of gold also had a fixed exchange rate against the dollar. A simple example will illustrate how this works.

Suppose the price of an ounce of gold is \$20 in the United States and £4 in the United Kingdom. The pound is worth five times the value of a dollar, since it takes five times as many dollars as pounds to buy one ounce of gold. Because 1 pound buys five times as much gold as 1 dollar, the exchange rate is £1 = \$5. Since currency values are linked by gold values, as the supply of gold fluctuates, there will be pressure to alter the prices of goods and services. The gold standard fixes only the current price of gold. As the stock of gold increases, everything else held constant, the gold and currency prices of goods and services will tend to rise (as would occur when the money supply increases).

A gold standard is only one possible *commodity money standard*. Any other highly valued commodity (silver, for instance) could serve as a standard linking monies in a fixed-exchange-rate system.

The gold standard ended with the outbreak of World War I. The war was partially funded by increases in the money supplies of the hostile nations. A gold standard would not permit such a rapid increase in the money supply unless the stock of gold increased dramatically, which it did not. As money supplies grew faster than gold supplies, the link between money and gold had to be broken. During the war years and the Great Depression of the 1930s, and on through World War II, there was no organized system for setting exchange rates. Foreign trade and investment shrank as a result of the war, obviating the need for a well-functioning method of determining exchange rates.



- 1 How does a commodity standard fix exchange rates between countries?

#### gold standard

A system whereby national currencies are fixed in terms of their value in gold, thus creating fixed exchange rates between currencies.

*A commodity money standard exists when exchange rates are fixed based on the values of different currencies in terms of some commodity.*



*The Bretton Woods agreement established a system of fixed exchange rates.*

### gold exchange standard

An exchange-rate system in which each nation fixes the value of its currency in terms of gold, but buys and sells the U.S. dollar rather than gold to maintain fixed exchange rates.

### reserve currency

A currency that is used to settle international debts and is held by governments to use in foreign exchange market interventions.

### International Monetary Fund (IMF)

An international organization that supervises exchange-rate arrangements and lends money to member countries that are experiencing problems meeting their external financial obligations.

### World Bank

An international organization that makes loans and provides technical expertise to developing countries.

### foreign exchange market intervention

The buying and selling of currencies by a central bank to achieve a specified exchange rate.

## 1.b. The Bretton Woods System

At the end of World War II, there was widespread political support for an exchange rate system linking all monies in much the same way as the gold standard had done. It was believed that a system of fixed exchange rates would promote the growth of world trade. In 1944, delegates from 44 nations met in Bretton Woods, New Hampshire, to discuss the creation of such a system. The agreement reached at this conference has had a profound impact on the world.

The exchange-rate arrangement that emerged from the Bretton Woods conference is often called a **gold exchange standard**. Each country was to fix the value of its currency in terms of gold, just as it had under the gold standard. The U.S. dollar price of gold, for instance, was \$35 an ounce. However, there were fundamental differences between this system and the old gold standard. The U.S. dollar, rather than gold, served as the focal point of the system. Instead of buying and selling gold, countries bought and sold U.S. dollars to maintain a fixed exchange rate with the dollar. Since the United States had the world's largest financial market and the strongest economy, its currency was the dominant world currency. The United States had the productive capacity to supply much-needed goods to the rest of the world, and these goods were priced in dollars.

The U.S. dollar was the **reserve currency** of the system. International debts were settled with dollars, and international trade contracts were often denominated in dollars. In effect, the world was on a dollar standard following World War II.

## 1.c. The International Monetary Fund and the World Bank

Two new organizations also emerged from the Bretton Woods conference: the International Monetary Fund and the World Bank. The **International Monetary Fund (IMF)** was created to supervise the exchange-rate practices of member countries and to encourage the free convertibility of any national money into the monies of other countries. The IMF also lends money to countries that are experiencing problems meeting their international payment obligations. The funds available to the IMF come from the annual membership fees (called *quotas*) of the 185 member countries of the IMF. The U.S. quota, for instance, is about \$57 billion, or about 17 percent of the total quotas of all member countries. (The term *quota* has a different meaning in this context from the one it has in international trade.)

The **World Bank** was created to help finance economic development in poor countries. It provides loans to developing countries at more favorable terms than are available from commercial lenders, and it also offers technical expertise. The World Bank obtains the funds it lends by selling bonds. It is one of the world's major borrowers. See the Global Business Insight "The IMF and the World Bank" for an explanation of how these institutions work.

## 1.d. The Transition Years

The Bretton Woods system of fixed exchange rates required countries to actively buy and sell dollars in order to maintain fixed exchange rates when the *free market equilibrium* in the foreign exchange market differed from the fixed rate. The free market equilibrium exchange rate is the rate that would be established in the absence of government intervention. Governmental buying and selling of currencies to achieve a target exchange rate is called **foreign exchange market intervention**. The effectiveness of such intervention is limited to situations in which free market pressure to deviate from the fixed exchange rate is temporary. For instance, suppose a country has a bad harvest and earns less foreign exchange than usual. This may be only a temporary situation if the

# GLOBAL BUSINESS INSIGHT



## The IMF and the World Bank

The International Monetary Fund (IMF) and the World Bank were both created at the Bretton Woods conference in 1944. The IMF oversees the international monetary system, promoting stable exchange rates and macroeconomic policies. The World Bank promotes the economic development of the poor nations. Both organizations are owned and directed by their 182 member countries.

The IMF provides loans to nations that are having trouble repaying their foreign debts. Before the IMF lends any money, however, the borrower must agree to certain conditions. The IMF *conditionality* usually requires that the country meet targets for key macroeconomic variables like money-supply growth, inflation, tax collections, and subsidies. The conditions attached to IMF loans are aimed at promoting stable economic growth.

The World Bank assists developing countries by providing long-term financing for development projects and

programs. The bank also provides expertise in many areas in which poor nations lack expert knowledge: agriculture, medicine, construction, and education, as well as economics. The IMF primarily employs economists to carry out its mission.

The diversity of World Bank activities results in the employment of about 10,000 people. The IMF has a staff of approximately 2,400. Both organizations post employees around the world, but most work at the organizations' headquarters in Washington, D.C.

World Bank funds are largely acquired by borrowing on the international bond market. The IMF receives its funding from member-country subscription fees, called quotas. A member's quota determines its voting power in setting IMF policies. The United States, whose quota accounts for the largest fraction of the total, has the most votes.

next harvest is plentiful and the country resumes its typical export sales. During the period of reduced exports, it will be necessary for the government of this country to intervene to avoid a depreciation of its domestic currency. In the 1960s, however, there were several situations in which permanent rather than temporary changes called for changes in exchange rates rather than government foreign exchange market intervention.

The Bretton Woods system was officially dissolved in 1971, at a meeting of the finance ministers of the leading world powers at the Smithsonian Institution in Washington, D.C. The Smithsonian agreement changed the exchange rates set during the Bretton Woods era. One result was a **devaluation** of the U.S. dollar. (A currency is said to be devalued when its value is officially lowered.)

Under the Smithsonian agreement, countries were to maintain fixed exchange rates at newly defined values. It soon became clear, however, that the new exchange rates were not **equilibrium exchange rates** that could be maintained without government intervention and that government intervention could not maintain the disequilibrium fixed exchange rates forever. The U.S. dollar was devalued again in February 1973, when the dollar price of gold was raised to \$42.22. This new exchange rate was still not an equilibrium rate, and in March 1973 the major industrial countries abandoned fixed exchange rates.

### devaluation

A deliberate decrease in the official value of a currency.

### equilibrium exchange rates

The exchange rates that are established in the absence of government foreign exchange market intervention.

*In March 1973, the major industrial countries abandoned fixed exchange rates for floating rates.*

### 1.e. Today

When the major industrial countries abandoned fixed exchange rates in March 1973, the world did not move to purely free-market-determined floating exchange rates. Under the system that has been in existence since that time, the major industrial countries intervene to keep their currencies within acceptable ranges, while many smaller countries maintain fixed exchange rates.



**2** What kinds of exchange-rate arrangements exist today?



The world today consists of some countries with fixed exchange rates, whose governments keep the exchange rates between two or more currencies constant over time; other countries with floating exchange rates, which shift on a daily basis according to the forces of supply and demand; and still others whose exchange-rate systems lie somewhere in between. Table 1, which lists the exchange-rate arrangements of over 180 countries, illustrates the diversity of exchange-rate arrangements currently in effect.

**TABLE 1** Exchange Rate Arrangements

**Monetary Policy Framework**

| Exchange Rate Arrangement<br>(number of countries)      | Exchange Rate Anchor  |   |   |  |  | Monetary Aggregate Target                     | Inflation Targeting Framework | Other <sup>1</sup> |
|---|---|---|---|--|--|---|-------------------------------|--------------------|
|   | U.S. dollar<br>(66)   |   | Euro (27)   | Composite<br>(15)  | Other<br>(7)                                       | (22)  | (44)                          | (11)               |
| Exchange arrangement with no separate legal tender (10) | Ecuador<br>El Salvador<br>Marshall Islands<br>Micronesia, Fed. States of  | Palau<br>Panama<br>Timor-Leste<br>Zimbabwe  | Kosovo<br>Montenegro<br>San Marino  |  | Kiribati   |   |                               |                    |
| Currency board arrangement (13)                         | Antigua and Barbuda <sup>2</sup><br>Djibouti<br>Dominica <sup>2</sup><br>Grenada <sup>2</sup><br>ECCU<br>Hong Kong SAR<br>St. Kitts and Nevis <sup>2</sup>  | St. Lucia <sup>2</sup><br>St. Vincent and the Grenadines <sup>2</sup>   | Bosnia and Herzegovina<br>Bulgaria<br>Estonia <sup>3</sup><br>Lithuania <sup>3</sup>  |  | Brunei<br>Darussalam                               |   |                               |                    |
| Other conventional fixed peg arrangement (68)           | Aruba<br>Bahamas<br>Bahrain<br>Bangladesh<br>Barbados<br>Belize<br>Eritrea<br>Guyana<br>Honduras<br>Jordan<br>Kazakhstan<br>Lebanon<br>Malawi<br>Maldives<br>Mongolia<br>Netherlands<br>Antilles<br>Oman<br>Qatar<br>Rwanda<br>Saudi Arabia | Seychelles<br>Sierra Leone<br>Solomon Islands<br>Sri Lanka<br>Suriname<br>Tajikistan<br>Trinidad and Tobago<br>Turkmenistan<br>United Arab Emirates<br>Venezuela, Rep.<br>Bolivariana de<br>Vietnam<br>Yemen, Rep. of | Cameroon <sup>5</sup><br>Cape Verde<br>Central African Rep. <sup>5</sup><br>Chad <sup>5</sup><br>Comoros<br>Congo, Rep. of <sup>5</sup><br>Côte d'Ivoire <sup>4</sup><br>Croatia<br>Denmark <sup>3</sup><br>Equatorial Guinea <sup>5</sup><br>Gabon <sup>5</sup><br>Guinea-Bissau <sup>4</sup><br>Latvia <sup>3</sup><br>Macedonia, FYR<br>Mali <sup>4</sup><br>Niger <sup>4</sup><br>Senegal <sup>4</sup><br>Togo <sup>4</sup><br>Slovak Rep. <sup>3</sup> | Fiji<br>Kuwait<br>Libya<br>Morocco<br>Russian Federation<br>Samoa<br>Tunisia | Bhutan<br>Lesotho<br>Namibia<br>Nepal<br>Swaziland | Argentina<br>Malawi<br>Rwanda<br>Sierra Leone |                               |                    |
| Pegged exchange rate within horizontal bands (3)        |   |   |   | Syria<br>Tonga<br>Belarus  |  |   |                               |                    |



TABLE 1 Exchange Rate Arrangements (Continued)

| Exchange Rate Arrangement<br>(number of countries)                     | Monetary Policy Framework   |                                 |   |   |   |   |                               |                      |
|--|---|---------------------------------|---|---|---|---|-------------------------------|----------------------|
|  |   |                                 |   |   |   | Monetary Aggregate Target   | Inflation Targeting Framework | Other <sup>1</sup>   |
|  | Exchange Rate Anchor  |                                 |   |   |   |   |                               |                      |
|  | U.S. dollar (66)  |                                 | Euro (27)   | Composite (15)  | Other (7)   | (22)  | (44)                          | (11)                 |
| Crawling peg (8)   | Bolivia<br>China<br>Ethiopia<br>Nicaragua<br>Uzbekistan   |                                 |   | Botswana<br>Iran, I.R. of   |   |   |                               |                      |
| Crawling band (2)  | Costa Rica  |                                 | Afghanistan, I.R. of<br>Burundi<br>Gambia<br>Georgia<br>Guinea<br>Haiti<br>Jamaica<br>Kenya<br>Madagascar                 | Azerbaijan  |   |   |                               |                      |
| Managed floating with no predetermined path for the exchange rate (44) | Cambodia<br>Kyrgyz Rep.<br>Lao P.D.R.<br>Liberia<br>Mauritania<br>Mauritius<br>Myanmar<br>Ukraine | Algeria<br>Singapore<br>Vanuatu | Moldova<br>Mozambique<br>Nigeria<br>Papua<br>New Guinea<br>São Tomé and Príncipe<br>Sudan<br>Tanzania<br>Uganda<br>Zambia | Colombia<br>Ghana<br>Guatemala<br>Indonesia<br>Peru<br>Romania<br>Serbia <sup>6</sup><br>Thailand<br>Uruguay  | Dominican Rep.<br>Egypt<br>India<br>Malaysia<br>Pakistan<br>Paraguay  |   |                               | Armenia <sup>6</sup> |
| Independently floating (40)  |   |                                 |   | Albania<br>Australia<br>Austria <sup>7</sup><br>Belgium<br>Brazil<br>Canada<br>Chile<br>Cyprus <sup>7</sup><br>Czech Rep.<br>Finland <sup>7</sup><br>France <sup>7</sup><br>Germany <sup>7</sup><br>Greece <sup>7</sup><br>Hungary<br>Iceland<br>Ireland <sup>7</sup><br>Israel<br>Italy <sup>7</sup><br>Korea, Rep. of | Luxembourg <sup>7</sup><br>Malta <sup>7</sup><br>Mexico<br>Netherlands <sup>7</sup><br>New Zealand<br>Norway<br>Philippines<br>Poland<br>Portugal <sup>7</sup><br>Slovenia <sup>7</sup><br>South Africa<br>Spain <sup>7</sup><br>Sweden<br>Turkey<br>United Kingdom | Congo,<br>Dem. Rep. of<br>Japan<br>Somalia <sup>8</sup><br>Switzerland<br>United States |                               |                      |

<sup>1</sup>Includes countries that have no explicitly stated nominal anchor, but rather monitor various indicators in conducting monetary policy.

<sup>2</sup>The member participates in the Eastern Caribbean Currency Union.

<sup>3</sup>The member participates in the Exchange Rate Mechanism II arrangement to maintain a fixed exchange rate with the euro with the eurozone.

<sup>4</sup>The member participates in the Central African Economic and Monetary Community.

<sup>5</sup>The member participates in the West African Economic and Monetary Union.

<sup>6</sup>The central bank has taken preliminary step toward inflation targeting and is preparing for the transition to full-fledged inflation targeting.

<sup>7</sup>The member participates in the European Economic and Monetary Union.

<sup>8</sup>As of end-December 1989.

Source: IMF, "De Facto Classification of Exchange Rate Arrangements and Monetary Frameworks," 2010, <http://www.imf.org/external/pubs/ft/ar/2010/eng/pdf/a2.pdf>.

We provide a brief description of each:

*Crawling pegs* The exchange rate is adjusted periodically by small amounts at a fixed, preannounced rate or in response to certain indicators (such as inflation differentials against major trading partners).

*Crawling bands* The exchange rate is maintained within certain fluctuation margins around a central rate that is periodically adjusted at a fixed, preannounced rate or in response to certain indicators.

*Managed floating* The monetary authority (usually the central bank) influences the exchange rate through active foreign exchange market intervention with no preannounced path for the exchange rate.

*Independently floating* The exchange rate is market determined, and any intervention is aimed at moderating fluctuations rather than at determining the level of the exchange rate.

*No separate legal tender* Either another country's currency circulates as the legal tender or the country belongs to a monetary union where the legal tender is shared by the members (like the euro).

*Currency board* A fixed exchange rate is established by a legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate. New issues of domestic currency are typically backed in some fixed ratio (like 1-to-1) by additional holdings of the key foreign currency.

*Fixed peg* The exchange rate is fixed against a major currency or some basket of currencies. Active intervention may be required to maintain the target pegged rate.

*Horizontal bands* The exchange rate fluctuates around a fixed central target rate. Such target zones allow for a moderate amount of exchange-rate fluctuation while tying the currency to the target central rate.

Note that the countries that use the euro as their currency are listed as "Independently floating." The euro floats against other currencies, but each of the member nations of the euro has no separate national money.

Table 2 lists the end-of-year exchange rates for several currencies versus the U.S. dollar beginning in 1950. For most of the currencies, there was little movement in the

**TABLE 2** Exchange Rates of Selected Countries (currency units per U.S. dollar)

| Year | Canadian Dollar | Japanese Yen | French Franc | German Mark | Italian Lira | British Pound | Euro |
|------|-----------------|--------------|--------------|-------------|--------------|---------------|------|
| 1950 | 1.06            | 361          | 3.5          | 4.2         | 625          | 0.36          | —    |
| 1955 | 1               | 361          | 3.5          | 4.22        | 625          | 0.36          | —    |
| 1960 | 1               | 358          | 4.9          | 4.17        | 621          | 0.36          | —    |
| 1965 | 1.08            | 361          | 4.9          | 4.01        | 625          | 0.36          | —    |
| 1970 | 1.01            | 358          | 5.52         | 3.65        | 623          | 0.42          | —    |
| 1975 | 1.02            | 305          | 4.49         | 2.62        | 684          | 0.5           | —    |
| 1980 | 1.19            | 203          | 4.52         | 1.96        | 931          | 0.42          | —    |
| 1985 | 1.4             | 201          | 7.56         | 2.46        | 1,679        | 0.69          | —    |
| 1990 | 1.16            | 134          | 5.13         | 1.49        | 1,130        | 0.52          | —    |
| 1995 | 1.36            | 103          | 4.9          | 1.43        | 1,584        | 0.65          | —    |
| 2000 | 1.49            | 114          | —            | —           | —            | 0.67          | 1.06 |
| 2005 | 1.16            | 118          | —            | —           | —            | 0.58          | 0.84 |
| 2010 | 0.99            | 81           | —            | —           | —            | 0.64          | 0.75 |

**Source:** End-of-year exchange rates from International Monetary Fund, *International Financial Statistics*, Washington, D.C., various issues, and Pacific Exchange Rate Service, <http://fx.sauder.ubc.ca/cgi/fxddata>.

1950s and 1960s, the era of the Bretton Woods agreement. In the early 1970s, exchange rates began to fluctuate. More recently, there has been considerable change in the foreign exchange value of a dollar, as Table 2 illustrates.

## RECAP

1. Under a gold standard, each currency has a fixed value in terms of gold. This arrangement provides for fixed exchange rates between countries.
2. At the end of World War II, the Bretton Woods agreement established a new system of fixed exchange rates. Two new organizations—the International Monetary Fund (IMF) and the World Bank—also emerged from the Bretton Woods conference.
3. Fixed exchange rates are maintained by government intervention in the foreign exchange market; governments or central banks buy and sell currencies to keep the equilibrium exchange rate steady.
4. The governments of the major industrial countries adopted floating exchange rates in 1973. In fact, the prevailing system is characterized by managed floating—that is, by occasional government intervention—rather than being a pure free-market-determined exchange-rate system.
5. Some countries choose floating exchange rates; others peg their currencies to a single currency or a composite.

## 2. Fixed or Floating Exchange Rates

Is the United States better off today with floating exchange rates than it was with the fixed exchange rates of the post–World War II period? The choice of an exchange-rate system has multiple implications for the performance of a nation's economy and, therefore, for the conduct of macroeconomic policy. As with many policy issues in economics, economists often disagree about the merits of fixed versus flexible exchange rates. Let us look at the characteristics of the different exchange-rate systems.



- 3** How is equilibrium determined in the foreign exchange market?

### 2.a. Equilibrium in the Foreign Exchange Market

An exchange rate is the price of one money in terms of another. Equilibrium is determined by the supply of and demand for the two currencies in the foreign exchange market. Figure 1 contains two supply and demand diagrams for the U.S. dollar–euro foreign exchange market. The downward-sloping demand curve indicates that the higher the dollar price of the euro, the fewer euros will be demanded. The upward-sloping supply curve indicates that the higher the dollar price of the euro, the more euros will be supplied.

In Figure 1(a), the initial equilibrium occurs at the point where the demand curve  $D_1$  intersects the supply curve. At this point, the equilibrium exchange rate is \$1.00 (1 euro costs \$1.00), and the quantity of euros bought and sold is  $Q_1$ .

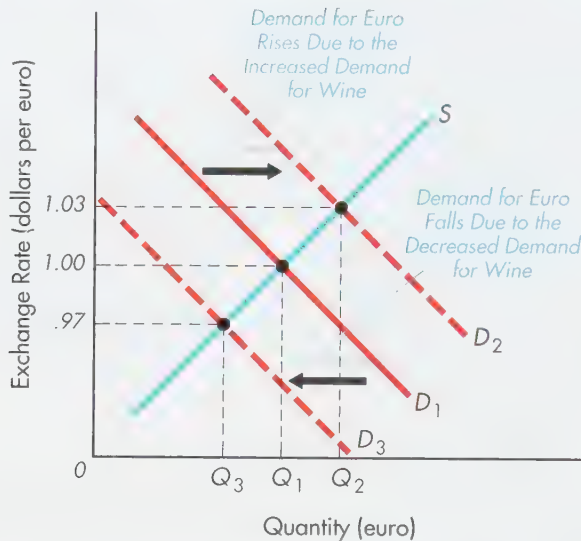
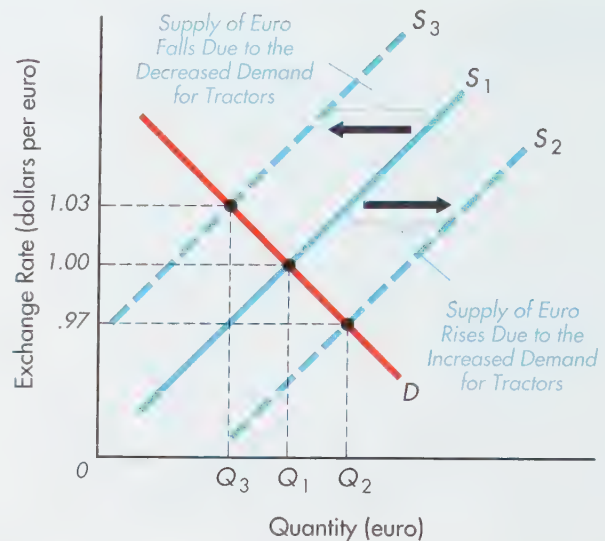
Suppose U.S. residents increase their demand for French wine. Because euros are needed to pay for the wine, the greater U.S. demand for French wine generates a greater demand for euros by U.S. citizens who hold dollars. The demand curve in Figure 1(a) thus shifts from  $D_1$  to  $D_2$ . This increased demand for euros causes the euro to appreciate relative to the dollar. The new exchange rate is \$1.03, and a greater quantity of euros,  $Q_2$ , is bought and sold.

If the U.S. demand for French wine falls, the demand for euros also falls, as illustrated by the shift from  $D_1$  to  $D_3$  in Figure 1(a). The decreased demand for euros causes the euro to depreciate relative to the dollar, so the exchange rate falls to \$.97.

So far, we have considered how shifts in the U.S. demand for French goods affect the dollar–euro exchange rate. We can also use the same supply and demand diagram to analyze how

*Equilibrium in the foreign exchange market occurs at the point where the foreign exchange demand and supply curves intersect.*



**FIGURE 1** The Supply of and Demand for Foreign Exchange**(a) A Change in the U.S. Demand for French Wine****(b) A Change in the French Demand for U.S. Tractors**

This figure represents the foreign exchange market for euros traded for dollars. The demand curve for euros is based partly on the U.S. demand for French products, and the supply curve of euros is based partly on the French demand for U.S. products. An increase in demand for French wine causes demand for euros to increase from  $D_1$  to  $D_2$ . This shift causes an increase from  $Q_1$  to  $Q_2$  in the equilibrium quantity of euros traded and causes the euro to appreciate to \$1.03 from the initial equilibrium exchange rate of \$1.00. A decrease in demand for French wine causes the demand for euros to fall from  $D_1$  to  $D_3$ . This shift leads to a fall in the equilibrium quantity traded to  $Q_3$  and a depreciation of the euro to \$.97. If the French demand for U.S. tractors falls, fewer euros are supplied for exchange for dollars, as illustrated by the fall in supply from  $S_1$  to  $S_3$ . This shift causes the euro to appreciate to \$1.03 and the equilibrium quantity of euros traded to fall to  $Q_3$ . If the French demand for U.S. tractors rises, then more euros are supplied for dollars and the supply curve increases from  $S_1$  to  $S_2$ . This causes the euro to depreciate and the equilibrium quantity of euros traded to rise to  $Q_2$ .

changes in the French demand for U.S. goods affect the equilibrium exchange rate. The supply of euros to the foreign exchange market partly originates with French residents who buy goods from the rest of the world. If a French importer buys a tractor from a U.S. firm, the importer must exchange euros for dollars to pay for the tractor. As French residents' demand for foreign goods and services rises and falls, the supply of euros to the foreign exchange market changes.

Suppose the French demand for U.S. tractors increases. This brings about a shift of the supply curve: As euros are exchanged for dollars to buy the U.S. tractors, the supply of euros increases. In Figure 1(b), the supply of euros curve shifts from  $S_1$  to  $S_2$ . The greater supply of euros causes the euro to depreciate relative to the dollar, and the exchange rate falls from \$1.00 to \$.97. If the French demand for U.S. tractors decreases, the supply of euros decreases from  $S_1$  to  $S_3$ , and the euro appreciates to \$1.03.

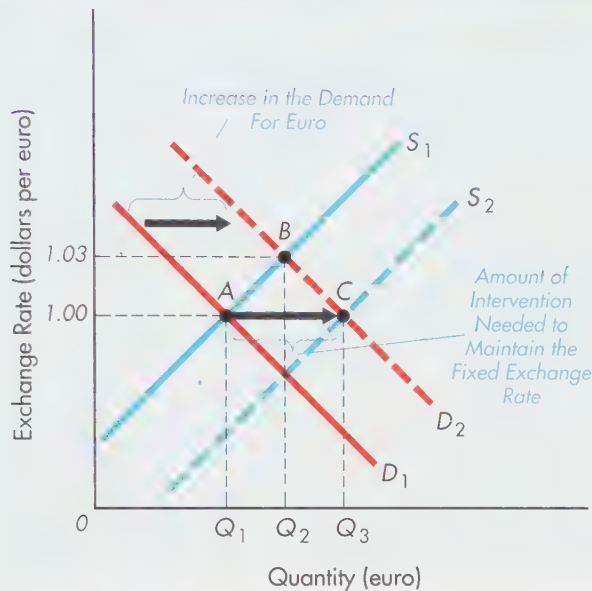
Foreign exchange supply and demand curves are affected by changes in tastes and technology and by changing government policy. As demand and supply change, the equilibrium exchange rate changes. In fact, continuous shifts in supply and demand cause the exchange rate to change as often as every day, on the basis of free-market forces. Now let us consider how fixed exchange rates differ from floating exchange rates.



- 4** How do fixed and floating exchange rates differ in their adjustment to shifts in supply and demand for currencies?

## 2.b. Adjustment Mechanisms under Fixed and Flexible Exchange Rates

Figure 2 shows the dollar-euro foreign exchange market. The exchange rate is the number of dollars required to buy 1 euro; the quantity is the quantity of euros bought and

**FIGURE 2** Foreign Exchange Market Equilibrium under Fixed and Flexible Exchange Rates

Initially, equilibrium is at point A; the exchange rate is \$1.00 and  $Q_1$  euros are traded. An increase in demand for French wine causes the demand for euros to increase from  $D_1$  to  $D_2$ . With flexible exchange rates, the euro appreciates in value to \$1.03 and  $Q_2$  euros are traded; equilibrium is at point B. If the government is committed to maintaining a fixed exchange rate of \$1.00, the supply of euros must be increased to  $S_2$  so that a new equilibrium can occur at point C. The government must intervene in the foreign exchange market and sell euros to shift the supply curve to  $S_2$ .

sold. Suppose that, initially, the equilibrium is at point A, with quantity  $Q_1$  euros traded at \$1.00 per euro.

Suppose French wine becomes more popular in the United States, and the demand for euros increases from  $D_1$  to  $D_2$ . With flexible exchange rates (as in Figure 1), a new equilibrium is established at point B. The exchange rate rises to \$1.03 per euro, and the quantity of euros bought and sold is  $Q_2$ . The increased demand for euros has caused the euro to **appreciate** (rise in value against the dollar) and the dollar to **depreciate** (fall in value against the euro). This is an example of a freely floating exchange rate, determined by the free-market forces of supply and demand.

Now suppose the Federal Reserve is committed to maintaining a fixed exchange rate of \$1.00 per euro. The increase in demand for euros causes a shortage of euros at the exchange rate of \$1.00. According to the new demand curve,  $D_2$ , the quantity of euros demanded at \$1.00 is  $Q_3$ . The quantity supplied is found on the original supply curve  $S_1$ , at  $Q_1$ . The only way to maintain the exchange rate of \$1.00 is for the Federal Reserve to supply euros to meet the shortage of  $Q_3 - Q_1$ . In other words, the Fed must sell  $Q_3 - Q_1$  euros to shift the supply curve to  $S_2$  and thus maintain the fixed exchange rate.

If the increased demand for euros is temporary, the Fed can continue to supply euros for the short time necessary. However, if the increased demand for euros is permanent, the Fed's intervention will eventually end when it runs out of euros. This situation—a permanent change in supply or demand—is referred to as a **fundamental disequilibrium**. The fixed exchange rate is no longer an equilibrium rate. Under the Bretton Woods agreement, a country was supposed to devalue its currency in such cases.

### appreciate

When the value of a currency increases under floating exchange rates—that is, exchange rates determined by supply and demand.

### depreciate

When the value of a currency decreases under floating exchange rates.

### fundamental disequilibrium

A permanent shift in the foreign exchange market supply and demand curves such that the fixed exchange rate is no longer an equilibrium rate.





Speculators buy and sell currencies in anticipation of future changes in exchange rates.

### speculators

People who seek to profit from an expected shift in an exchange rate by selling the currency that is expected to depreciate and buying the currency that is expected to appreciate, then exchanging the appreciated currency for the depreciated currency after the exchange-rate adjustment.

Suppose that the shift to  $D_2$  in Figure 2 is permanent. In this case, the dollar should be devalued. A devaluation to \$1.03 per euro would restore equilibrium in the foreign exchange market without requiring further intervention by the government. Sometimes, however, governments try to maintain the old exchange rate (\$1.00 per euro, in this case), even though most people believe the shift in demand to be permanent. When this happens, **speculators** buy the currency that is in greater demand (euros, in our example) in anticipation of the eventual devaluation of the other currency (dollars, in Figure 2). A speculator who purchases the euro for \$1.00 prior to the devaluation and sells them for \$1.03 after the devaluation earns \$.03 per euro purchased.

Speculation puts greater devaluation pressure on the dollar: The speculators sell dollars and buy euros, causing the demand for euros to increase even further. Such speculative activity contributed to the breakdown of the Bretton Woods system of fixed exchange rates. Several countries intervened to support exchange rates that were far out of line with free-market forces. The longer a devaluation was put off, the more obvious it became that the devaluation was forthcoming and the more speculators entered the market. In 1971 and 1973, speculators sold dollars for yen and German marks. They were betting that the dollar would be devalued; both times they were correct. The speculative activity of the early 1970s drew attention to the folly of efforts to maintain fixed exchange rates in the face of a change in the fundamental equilibrium exchange rate.



- 5** What are the advantages and disadvantages of fixed and floating exchange rates?

## 2.c. Constraints on Economic Policy

Fixed exchange rates can be maintained over time only between countries with similar economic policies and similar underlying economic conditions. As prices rise within a country, the domestic value of a unit of that country's currency falls, since the currency buys fewer goods and services. In the foreign exchange market too, the value of a unit of domestic currency falls, since it buys relatively fewer goods and services than the foreign currency does. A fixed exchange rate thus requires that the purchasing power of the



two currencies change at roughly the same rate over time. Only if two nations have approximately the same inflation experience will they be able to maintain a fixed exchange rate. This condition was a frequent source of problems in the Bretton Woods era of fixed exchange rates. In the late 1960s, for instance, the U.S. government was following a more expansionary macroeconomic policy than was Germany. U.S. government expenditures on the war in Vietnam and domestic antipoverty initiatives led to inflationary pressures that were not matched in Germany. Between 1965 and 1970, price levels rose by 23.2 percent in the United States but by only 12.8 percent in Germany. Since the purchasing power of the dollar was falling faster than that of the mark, the fixed exchange rate could not be maintained. The dollar had to be devalued.

One of the advantages of floating exchange rates is that countries are free to pursue their own macroeconomic policies without worrying about maintaining an exchange-rate commitment. If U.S. policy produces a higher inflation rate than Japanese policy, the dollar will automatically depreciate in value against the yen. The United States can choose the macroeconomic policy it wants, independently of other nations, and let the exchange rate adjust if its inflation rate differs markedly from that of other nations. If the dollar were fixed in value relative to the yen, the two nations couldn't follow independent policies and expect to maintain the exchange rate.

It became obvious in the late 1960s that many governments considered other issues more important than maintenance of a fixed exchange rate. A nation that puts a high priority on reducing unemployment will typically stimulate the economy to try to increase income and create jobs. This initiative may cause the domestic inflation rate to rise and the domestic currency to depreciate relative to other currencies. If one goal or the other—lower unemployment or a fixed exchange rate—must be given up, it is likely that the exchange-rate goal will be sacrificed.

Floating exchange rates allow countries to formulate their domestic economic policy solely in response to domestic issues; they need not pay attention to the economic policies of the rest of the world. For residents of some countries, this freedom may be more of a problem than a benefit. The freedom to choose a rate of inflation and let the exchange rate adjust itself can have undesirable consequences in countries whose politicians, for whatever reason, follow highly inflationary policies. In these countries, a fixed-exchange-rate system would impose discipline, since maintenance of the exchange rate would not permit policies that diverged sharply from those of its trading partner.

## RECAP

1. Under a fixed-exchange-rate system, governments must sometimes intervene in the foreign exchange market to maintain the exchange rate. A fundamental disequilibrium requires a currency devaluation.
2. Fixed exchange rates can be maintained only between countries with similar macroeconomic policies and similar underlying economic conditions.
3. Fixed exchange rates serve as an anchor to constrain inflationary government policies.

## 3. Prices and Exchange Rates

An exchange rate, as you learned in earlier chapters, is the price of one money in terms of another. The exchange rate doesn't enter into the purchase and sale of Fords in Michigan and California because each state uses the U.S. dollar. But for goods and services that are traded across national borders, the exchange rate is an important part of the



- 6 How does a change in the exchange rate affect the prices of goods traded between countries?

total price. We will assume that currencies are traded freely for each other and that foreign exchange markets respond to supply and demand without government intervention.

Let's look at an example. A U.S. wine importer purchases 1,000,000 euros (€1,000,000) worth of wine from France. The importer demands euros in order to pay the French wine seller. Suppose the initial equilibrium exchange rate is  $\$1 = €1$ . At this rate, the U.S. importer needs 1,000,000 euros at  $\$1$  apiece, or  $\$1,000,000$ .

### 3.a. Appreciation and Depreciation

When the exchange rate between two currencies changes, we say that one currency *depreciates* while the other *appreciates*. Suppose the exchange rate goes from  $\$1 = €1$  to  $\$1.10 = €1$ . The euro is now worth  $\$1.10$  instead of  $\$1$ . The dollar has depreciated in value in relation to the euro; dollars are worth less in terms of euros. At the new equilibrium exchange rate, the U.S. importer needs  $\$1,100,000$  ( $\$1.10 \times 1,000,000$ ) to buy €1,000,000 worth of wine.

Instead of saying that the dollar has depreciated against the euro, we can say that the euro has *appreciated* against the dollar. If the dollar is depreciating against the euro, the euro must be appreciating against the dollar. Whichever way we describe the change in the exchange rate, the result is that euros are now worth more in terms of dollars. The price of a euro has gone from  $\$1$  to  $\$1.10$ .

As exchange rates change, the prices of goods and services traded in international markets also change. Suppose the dollar appreciates against the euro. This means that a euro costs fewer dollars; it also means that French goods cost U.S. buyers less. If the exchange rate falls to  $\$.90 = €1$ , then €1,000,000 costs  $\$900,000$  ( $\$.90 \times 1,000,000$ ). The French wine has become less expensive to the U.S. importer.

- When the domestic (home) currency *depreciates*, foreign goods become *more expensive* to domestic buyers.
- When the domestic currency *appreciates*, foreign goods become *less expensive* to domestic buyers.

Let's look at the problem from the French side. When the dollar price of the euro rises, the euro price of the dollar falls; and when the dollar price of the euro falls, the euro price of the dollar rises. If the dollar price of the euro ( $\$/€$ ) is originally  $\$1$ , the euro price of the dollar ( $€/ \$$ ) is the reciprocal ( $1/1$ ), or  $€1$ . If the dollar depreciates against the euro to  $\$1.10$ , then the euro appreciates against the dollar to  $1/1.10$ , or  $€.91$ . As the euro appreciates, U.S. goods become less expensive to French buyers. If the dollar appreciates against the euro to  $\$.90$ , then the euro depreciates against the dollar to  $1/ .90$ , or  $€1.11$ . As the euro depreciates, U.S. goods become more expensive to French buyers.

- When the domestic currency *depreciates*, domestic goods become *less expensive* to foreign buyers.
- When the domestic currency *appreciates*, domestic goods become *more expensive* to foreign buyers.

The exchange rate is just one determinant of the demand for goods and services. Income, tastes, the prices of substitutes and complements, expectations, and the exchange rate all determine the demand for U.S. wheat, for example. As the dollar depreciates in relation to other currencies, the demand for U.S. wheat increases (along with foreign demand for all other U.S. goods), even if all the other determinants do not change. Conversely, as the dollar appreciates, the demand for U.S. wheat falls (along with foreign demand for all other U.S. goods), even if all the other determinants do not change.

### 3.b. Purchasing Power Parity

Within a country, where prices are quoted in terms of a single currency, all we need to know is the price in the domestic currency of an item in two different locations to determine where our money buys more. If Joe's bookstore charges \$20 for a book and Pete's bookstore charges \$30 for the same book, the purchasing power of our money is greater at Joe's than it is at Pete's.

International comparisons of prices must be made using exchange rates because different countries use different monies. Once we cross national borders, prices are quoted in different currencies. Suppose Joe's bookstore in New York City charges \$20 for a book and Pierre's bookstore in Paris charges €30. To compare the prices, we must know the exchange rate between dollars and euros.

If we find that goods sell for the same price in different markets, our money has the same purchasing power in those markets, which means that we have **purchasing power parity (PPP)**. The PPP reflects a relationship among the domestic price level, the exchange rate, and the foreign price level:

$$P = EP^F$$

where

$P$  = the domestic price

$E$  = the exchange rate (units of domestic currency per unit of foreign currency)

$P^F$  = the foreign price

If the dollar-euro exchange rate is .67 (\$.67 = €1), then a book priced at €30 in Pierre's store in Paris costs the same as a book priced at \$20 in Joe's New York store:

$$\begin{aligned} P &= EP^F \\ &= \$.67 \times 30 \\ &= \$20 \end{aligned}$$

The domestic price (we are assuming that the U.S. dollar is the domestic currency) equals the exchange rate times the foreign price. Because the dollar price of the book in Paris is \$20 and the price in the United States is \$20, PPP holds. The purchasing power (value) of the dollar is the same in both places.

Realistically, similar goods don't always sell for the same price everywhere. Actually, they don't even sell for the same price within a country. If the same textbook is priced differently at different bookstores, it is unrealistic to expect the price of the book to be identical worldwide. There are several reasons why PPP does not hold. The most important are that goods are not identical, that information is costly, that shipping costs affect prices, and that tariffs and legal restrictions on trade affect prices. If these factors did not exist, we would expect that anytime a price was lower in one market than in another, people would buy in the low-price market (pushing prices up) and simultaneously sell in the high-price market (pushing prices down). This activity, known as *arbitrage*, would ensure that PPP holds.

#### **purchasing power parity (PPP)**

The condition under which monies have the same purchasing power in different markets.



**7** Why don't similar goods sell for the same price all over the world?

### RECAP

1. When the exchange rate between two currencies changes, one currency depreciates while the other appreciates.
2. Purchasing power parity means that money has the same purchasing power in different markets.
3. Similar goods do not sell for the same price all over the world because goods are not identical, information is costly, shipping costs affect prices, and tariffs and legal restrictions on international trade affect prices.



## 4. Interest Rates and Exchange Rates

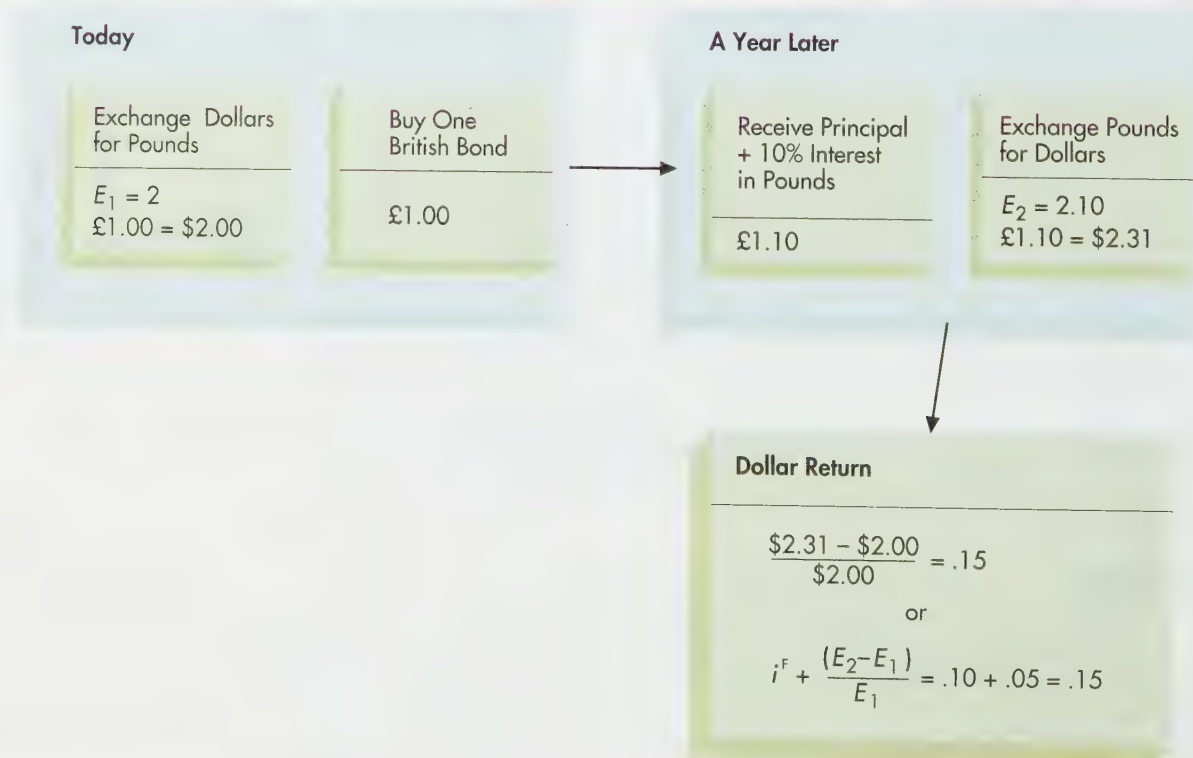
Exchange rates are used to compare international prices of goods and services. They are also used to compare the return on foreign currency-denominated stocks and bonds to the return on domestic assets. For example, suppose you have a choice of buying a U.S. bond or a U.K. bond. The U.S. bond is denominated in dollars and pays 15 percent interest; the U.K. bond is denominated in British pounds and pays 10 percent interest. Because you are a U.S. resident and you ultimately want dollars for household spending, you must compare the dollar return from holding each bond.

### 4.a. The Domestic Currency Return from Foreign Bonds

The U.S. bond is denominated in dollars, so the 15 percent interest is a dollar return. The U.K. bond, on the other hand, promises to pay 10 percent in terms of British pounds. If you buy the U.K. bond, you exchange dollars for pounds at the time the bond is purchased. When the bond matures, you exchange the principal and interest (the proceeds), trading pounds for dollars. If the exchange rate remains the same, the return on the U.K. bond is 10 percent. But if the exchange rate changes between the time you buy the bond and the time it matures, your return in dollars may be more or less than 10 percent.

Figure 3 shows what happens when a U.S. resident buys a one-year U.K. bond. Suppose the exchange rate is  $\$2 = \pounds 1$  when the bond is purchased, and the bond sells

**FIGURE 3** A U.S. Resident Buys a One-Year U.K. Bond



for £1. The U.S. resident needs \$2 to buy the bond. A year later, the bond matures. The bondholder receives the principal of £1 plus 10 percent interest (£1.10). Now the U.S. resident wants to convert the pounds into dollars. If the exchange rate has gone up from  $\$2 = £1$  to  $\$2.10 = £1$ , the £1.10 proceeds from the bond are converted into dollars at the rate of 2.10 dollars per pound. The *dollar value* of the proceeds is \$2.31 (the exchange rate [2.10] multiplied by the pound proceeds [£1.10]). The *dollar return* from the U.K. bond is the percentage difference between the dollar proceeds received after one year and the initial dollar amount invested, or approximately 15 percent:

$$\begin{aligned}\text{Dollar return} &= \frac{\$2.31 - \$2}{\$2} \\ &= \frac{\$.31}{\$2} \\ &= .15\end{aligned}$$

We can also determine the dollar return from the U.K. bond by adding the U.K. interest rate to the percentage change in the exchange rate. The percentage change in the exchange rate is 5 percent:

$$\begin{aligned}\text{Percentage change in exchange rate} &= \frac{\$2.10 - \$2}{\$2} \\ &= \frac{\$.10}{\$2} \\ &= .05\end{aligned}$$

The dollar return from the U.K. bond equals the 10 percent interest paid in British pounds plus the 5 percent change in the exchange rate, or 15 percent.

In our example, the pound appreciates against the dollar. When the pound increases in value, foreign residents holding pound-denominated bonds earn a higher return on those bonds than the pound interest rate. If the pound depreciates against the dollar, so that the pounds received at maturity are worth less than the pounds originally purchased, then the dollar return from the U.K. bond is lower than the interest rate on the bond. If the pound depreciates 5 percent, the dollar return is just 5 percent (the interest rate [10 percent] *minus* the exchange rate change [5 percent]).

We calculate the domestic currency return on a foreign bond by adding the foreign interest rate ( $i^F$ ) plus the percentage change in the exchange rate  $[(E_2 - E_1)/E_1]$ , where  $E_2$  is the dollar price of a unit of foreign currency in the next period, when the bond matures, and  $E_1$  is the exchange rate in the current period, when the bond is purchased:

$$\begin{aligned}\text{Domestic currency return} &= \text{foreign interest rate} + \text{percentage change in} \\ &\quad \text{exchange rate} \\ &= i^F + \frac{E_2 - E_1}{E_1}\end{aligned}$$

## 4.b. Interest Rate Parity

Because U.S. residents can hold U.S. bonds, U.K. bonds, or the bonds or other securities of any country they choose, they compare the returns from the alternatives when deciding what assets to buy. Foreign investors do the same thing. One product of this process is a close relationship among international interest rates. Specifically, the return, or interest rate, on similar bonds tends to be the same when returns are measured in terms of the domestic currency. This is called **interest rate parity (IRP)**.

Interest rate parity is the financial asset version of purchasing power parity. Similar financial assets have the same percentage return when that return is computed in terms



**8** How do we find the domestic currency return on a foreign bond?



**9** What is the relationship between domestic and foreign interest rates and changes in the exchange rate?

### interest rate parity (IRP)

The condition under which similar financial assets have the same interest rate when measured in the same currency.

of one currency. Interest rate parity defines a relationship among the domestic interest rate, the foreign interest rate, and the expected change in the exchange rate:

$$\text{Domestic interest rate} = \text{foreign interest rate} + \text{expected change in exchange rate}$$

In our example, the U.S. bond pays 15 percent interest; the U.K. bond offers 10 percent interest in pounds. If the pound is expected to appreciate 5 percent, the U.K. bond offers U.S. residents an expected dollar return of 15 percent. Interest rate parity holds in this case. The domestic interest rate is 15 percent, which equals the foreign interest rate (10 percent) plus the expected change in the exchange rate (5 percent).

Interest rate parity is the product of arbitrage in financial markets. If U.S. bonds and U.K. bonds are similar in every respect except for the currency used to pay the principal and interest, then they should yield similar returns to bondholders. If U.S. investors can earn a higher return by buying U.K. bonds, they are going to buy more U.K. bonds and fewer U.S. bonds. This tends to raise the price of U.K. bonds, pushing U.K. interest rates down. At the same time, the price of U.S. bonds drops, raising U.S. interest rates. The initial higher return on U.K. bonds and resulting greater demand for U.K. bonds increases the demand for pounds, increasing the value of the pound versus the dollar today. As the pound appreciates today, if investors expect the same future exchange rate as they did before the current appreciation, the expected appreciation in the future falls. The change in the exchange rate and interest rates equalizes the expected dollar return from holding a U.S. bond or a U.K. bond. U.K. bonds originally offered a higher return than U.S. bonds, but the increase in demand for U.K. bonds relative to U.S. bonds lowers both U.K. interest rates and the expected appreciation of the pound, so that the bond returns are equalized.

## RECAP

1. The domestic currency return from a foreign bond equals the foreign interest rate plus the percentage change in the exchange rate.
2. Interest rate parity exists when similar financial assets have the same interest rate when measured in

the same currency or when the domestic interest rate equals the foreign interest rate plus the expected change in the exchange rate.

## SUMMARY

1. How does a commodity standard fix exchange rates between countries?
  - Between 1880 and 1914, a gold standard provided for fixed exchange rates among countries. §1.a
  - The gold standard ended with World War I, and no established international monetary system replaced it until after World War II, when the Bretton Woods agreement created a fixed-exchange-rate system. §1.b
2. What kinds of exchange-rate arrangements exist today?
  - Today some countries have fixed exchange rates, others have floating exchange rates, and still others have managed floats or other types of systems. §1.e
3. How is equilibrium determined in the foreign exchange market?
  - Foreign exchange market equilibrium is determined by the intersection of the demand and supply curves for foreign exchange. §2.a



4. **How do fixed and floating exchange rates differ in their adjustment to shifts in supply and demand for currencies?**
  - Under fixed exchange rates, central banks must intervene in the foreign exchange market to keep the exchange rate from shifting. §2.b
5. **What are the advantages and disadvantages of fixed and floating exchange rates?**
  - Floating exchange rates permit countries to pursue independent economic policies. A fixed exchange rate requires a country to adopt policies similar to those of the country whose currency it is pegged to. A fixed exchange rate may serve to prevent a country from pursuing inflationary policies. §2.c
6. **How does a change in the exchange rate affect the prices of goods traded between countries?**
  - When the domestic currency depreciates against other currencies, foreign goods become more expensive to domestic buyers and domestic goods become less expensive to foreign buyers. §3.a
  - When the domestic currency appreciates against other currencies, foreign goods become less expensive to domestic buyers and domestic goods become more expensive to foreign buyers. §3.a
7. **Why don't similar goods sell for the same price all over the world?**
  - Purchasing power parity exists when monies have the same value in different markets. §3.b
  - Deviations from PPP arise because goods are not identical in different countries, information is costly, shipping costs affect prices, and tariffs and restrictions on trade affect prices. §3.b
8. **How do we find the domestic currency return on a foreign bond?**
  - The domestic currency return from holding a foreign bond equals the foreign interest rate plus the percentage change in the exchange rate. §4.a
9. **What is the relationship between domestic and foreign interest rates and changes in the exchange rate?**
  - Interest rate parity exists when the domestic interest rate equals the foreign interest rate plus the expected change in the exchange rate, so that similar financial assets yield the same return when measured in the same currency. §4.b

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appreciate, 481  
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## EXERCISES

1. Under a gold standard, if the price of an ounce of gold is 1,400 U.S. dollars and 1,300 Canadian dollars, what is the exchange rate between U.S. and Canadian dollars?
2. What were the three major results of the Bretton Woods conference?
3. What is the difference between the IMF and the World Bank?
4. How can Mexico fix the value of the peso relative to the dollar when the demand for and supply of dollars and pesos changes continuously? Illustrate your explanation with a graph.
5. Draw a foreign exchange market supply and demand diagram to show how the yen-dollar exchange rate is determined. Set the initial equilibrium at a rate of 100 yen per dollar.

6. Using the diagram in exercise 5, illustrate the effect of a change in tastes that prompts Japanese residents to buy more goods from the United States. If the exchange rate is floating, what will happen to the foreign exchange market equilibrium?
7. Using the diagram in exercise 5, illustrate the effect of the change in Japanese tastes if exchange rates are fixed. What will happen to the foreign exchange market equilibrium?
8. When and why should exchange rates change under a fixed-exchange-rate system?
9. Suppose you just returned home from a vacation in Mazatlán, Mexico, where you exchanged U.S. dollars for Mexican pesos. How did your trip to Mexico affect the supply and demand for dollars and the exchange rate (assume that all other things are equal)?
10. What does it mean to say that a currency appreciates or depreciates in value? Give an example of each and briefly mention what might cause such a change.
11. How does a currency speculator profit from exchange-rate changes? Give an example of a profitable speculation.
12. Find the U.S. dollar value of each of the following currencies at the given exchange rates:
  - a.  $\$1 = \text{C}\$0.96$  (Canadian dollars)
  - b.  $\$1 = \text{¥}81$  (Japanese yen)
  - c.  $\$1 = \text{A}\$0.95$  (Australian dollars)
  - d.  $\$1 = \text{SKr}6$  (Swedish kronor)
  - e.  $\$1 = \text{SF}0.90$  (Swiss francs)
13. You are a U.S. importer who buys goods from many different countries. How many U.S. dollars do you need to settle each of the following invoices?
  - a. 1,000,000 Australian dollars for wool blankets (exchange rate:  $\text{A}\$1 = \$0.769$ )
  - b. 500,000 British pounds for dishes (exchange rate:  $\text{£}1 = \$1.5855$ )
  - c. 100,000 Indian rupees for baskets (exchange rate:  $\text{Rs}1 = \$0.0602$ )
  - d. 350 million Japanese yen for stereo components (exchange rate:  $\text{¥}1 = \$0.0069$ )
  - e. 825,000 euros for German wine (exchange rate:  $\text{€}1 = \$1.05$ )
14. What is the dollar value of the invoices in exercise 13 if the dollar:
  - a. depreciates 10 percent against the Australian dollar
  - b. appreciates 10 percent against the British pound
  - c. depreciates 10 percent against the Indian rupee
  - d. appreciates 20 percent against the Japanese yen
  - e. depreciates 100 percent against the euro
15. Explain purchasing power parity and why it does not hold perfectly in the real world.
16. Write an equation that describes purchasing power parity and explain the equation.
17. Write an equation that describes interest rate parity and explain the equation.
18. If the interest rate on one-year government bonds is 5 percent in Germany and 8 percent in the United States, what do you think is expected to happen to the dollar value of the euro? Explain your answer.
19. In 1960 a U.S. dollar sold for 620 Italian lire. If PPP held in 1960, what would the PPP value of the exchange rate have been in 1987 if Italian prices rose 12 times and U.S. prices rose 4 times between 1960 and 1987?

You can find further practice tests in the Online Quiz at [www.cengage.com/economics/boyes](http://www.cengage.com/economics/boyes).

## FREQUENTLY ASKED QUESTIONS: EU ENLARGEMENT AND ECONOMIC AND MONETARY UNION (EMU)

### 1. Which countries have joined the EU since the ECB was established in 1998?

The Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia, and Slovakia became members of the EU on May 1, 2004. Two other countries, Bulgaria and Romania, joined the EU on January 1, 2007. Croatia, the Former Yugoslav Republic of Macedonia, and Turkey are official candidates for accession to the EU.

### 2. Will the new Member States automatically adopt the euro after joining the EU?

No, they won't. However, they are expected to do so when they fulfill the Maastricht convergence criteria (see question 4 below). Unlike Denmark and the United Kingdom, the new EU Member States do not have a right to opt out of the single currency.

### 3. When are the new Member States expected to adopt the euro?

There is no preset timetable for the adoption of the euro by these countries as the Governing Council of the ECB noted in its "Policy position of the Governing Council of the ECB on exchange rate issues relating to the acceding countries," published on December 18, 2003. In order to adopt the euro, they have to achieve a high degree of sustainable

economic convergence. This is assessed by the EU Council on the basis of reports produced by the Commission and the ECB on the degree of these countries' fulfillment of the Maastricht convergence criteria. These reports are prepared at least once every two years, or at the request of a Member State wishing to adopt the euro.

### 4. What are the convergence criteria?

In order to adopt the euro, Member States have to achieve a high degree of sustainable economic convergence. This is assessed on the basis of the fulfillment of the Maastricht convergence criteria set out in Article 121 of the Treaty establishing the European Community and further detailed in a Protocol attached to the Treaty. The criteria entail:

- "the achievement of a high degree of price stability." This means that "a Member State has a price performance that

is sustainable and an average rate of inflation, observed over a period of one year before the examination, that does not exceed by more than 1½ percentage points that of, at most, the three best performing Member States in terms of price stability";

- "the sustainability of the government financial position." This means that, at the time of the examination, the Member State should not be deemed by the Council to have an excessive deficit. The Council decides whether or not an excessive deficit exists by referring to:

1. the ratio of the planned or actual government deficit to GDP at market prices, which should not exceed 3 percent,
2. the ratio of government debt to GDP at market prices, which should not exceed 60 percent.

However, the assessment of compliance with the fiscal discipline requirement will also take into account other factors, such as past progress in reducing budgetary imbalances and/or the existence of exceptional and temporary factors contributing to





such imbalances. At the same time, Member States with government debt ratios to GDP in excess of 60 percent are expected to bring them down toward the reference level at a satisfactory pace.

- “the observance of the normal fluctuation margins provided for by the exchange rate mechanism of the European Monetary System, for at least two years, without devaluing

against the currency of any other Member State.”

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**Source:** European Central Bank, <http://www.ecb.int/ecb/history/enlargement/html/faqlarge.en.html#l4>.

**T**he expansion of the European Union to include the countries from eastern Europe holds much promise for the economic development of these countries. Once in the EU, these countries can trade freely with the other EU countries, just as the states of the United States trade freely with one another. Just as the U.S. states all share a common money to help facilitate interstate trade, it is likely that the Eastern European countries will also welcome the adoption of the euro as their money to further solidify the links between their economies and those of the rest of the EU. The article discusses the criteria that the new accession countries must meet before joining the euro. In general, their macroeconomic policy must converge to that of the current euro-area countries as defined by the "Maastricht convergence criteria" (Maastricht is a town in the Netherlands where the convergence treaty was agreed upon). The criteria include such things as convergence of inflation rates, budget deficits, and government debt to levels near the average existing in the euro area.

A fixed-exchange-rate system represents an agreement among countries to convert their individual currencies from one to another at a given rate. The adoption of one money for Europe is the strongest possible commitment to fixed exchange rates among the EU countries. If every nation uses the same currency, the euro, then all will be linked to the same inflation rate and there will be no fluctuation of the value of the currency across the EU nations using the currency—just as each state in the United States uses the same money, the U.S. dollar. The adoption of a single currency requires that economic policies across EU countries be similar. This means that individual countries must subordinate their monetary policies to the goals of the European Central Bank. If each nation insists on exercising its own monetary and fiscal policies and chooses different interest and inflation rates, there can never be one money. A crisis in the eurozone arose in 2010–2011 due to the divergence of fiscal policy in

Greece, Portugal, Ireland, and Spain. This experience just underscores the difficulty of having different nations with different policies sharing one money.

A convergence in inflation rates is necessary for the smooth operation of any fixed exchange rate. Persistent inflation differentials across the members of a fixed-exchange-rate system affect the competitiveness of each member's exports in the world market. Though a fixed-exchange-rate system maintains stable *nominal exchange rates* (the rate observed in the foreign exchange market), the competitiveness of a currency is represented by the *real exchange rate*. The real exchange rate is the nominal exchange rate adjusted for the price level at home compared to the price level abroad:

Real exchange rate =

$$\frac{\text{nominal exchange rate} \times \text{foreign price level}}{\text{domestic price level}}$$

The disruptive changes in competitiveness caused by persistent inflation differentials require a realignment of a fixed-exchange-rate system that adjusts nominal exchange rates to keep real exchange rates from drifting too far from their correct value. For instance, if the Italian price level starts to rise faster than the German price level, Italian goods will be priced out of the German market unless there is an Italian currency that depreciates on the foreign exchange market. According to the equation just presented, if Italy is the domestic country and its price level rises, the real exchange rate falls and Italian goods are, therefore, relatively more expensive unless the nominal exchange rate rises to offset the higher domestic price level. The need for similar inflation rates within a fixed-exchange-rate system indicates that a country can successfully join a fixed-exchange-rate system or a region with one money only when its inflation rate falls to a level close to that of other European countries.

Any countries seeking to join the euro area must align their economic policies with those of the other member countries.



# glossary

## A

**absolute advantage** - an advantage derived from one country having a lower absolute input cost of producing a particular good than another country.

**accounting profit** - net operating income.

**adverse selection** - the situation in which higher-quality goods, consumers, or producers are driven out of the market by lower-quality examples because of limited information about the quality.

**antitrust policy** - government policies and programs designed to control the growth of monopoly and enhance competition.

**appreciate** - when the value of a currency increases under floating exchange rates—that is, exchange rates determined by supply and demand.

**arc elasticity** - price elasticity of demand measured over a range of prices and quantities along the demand curve.

**association as causation** - the mistaken assumption that because two events seem to occur together, one causes the other.

**asymmetric information** - when the parties to a transaction do not have the same information about the transaction.

**average fixed cost (AFC)** - the total fixed cost divided by total output.

**average physical-product (APP)** - output per unit of resource.

**average total cost (ATC)** - the per unit cost, derived by dividing total cost by the quantity of output.

**average variable cost (AVC)** - total variable cost divided by total output.

## B

**back-end load** - a fee that you pay if you sell a mutual fund within a certain time frame.

**backward-bending labor supply curve** - a labor supply curve indicating that a person is willing and able to work more hours as the wage rate increases until, at some sufficiently high wage rate, the person chooses to work fewer hours.

**barrier to entry** - anything that impedes the ability of firms to begin a new business in an industry in which existing firms are earning positive economic profits.

**barter** - the direct exchange of goods and services without the use of money.

**behavioral economics** - the study of decision making assuming that people are rational in a broad sense.

**bond** - an IOU issued by a borrower to a lender.

**bounded rationality** - the understanding that perfect information is not likely to be available, and that as a result people make decisions that in hindsight look irrational, but in reality are the rational results of a brain that is economizing.

**break-even price** - a price that is equal to the minimum point of the average-total-cost curve.

**bubble** - a situation in which the price of an asset is being bid up through speculation or gambling rather than because of the value of the services the asset returns.

**budget deficit** - the shortage that results when government spending is greater than tax revenue.

**budget line** - a line showing all the combinations of goods that can be purchased with a given level of income.

**budget surplus** - the excess that results when government spending is less than tax revenue.

**business firm** - a business organization controlled by a single management.

## C

**capital** - products such as machinery and equipment that are used in production.

**cartel** - an organization of independent firms whose purpose is to control and limit production and maintain or increase prices and profits.

**cash transfers** - money allocated away from one group in society to another.

**circular flow diagram** - a model showing the flow of output and income from one sector of the economy to another.

**club good** - a good that is excludable but nonrivalrous.

**commercial policy** - government policy that influences international trade flows.

**commons good** - a good that is rivalrous but nonexcludable.

**comparable investment** - a stock that has the same features, such as risk and liquidity, as the one that buyers and sellers are evaluating.

**comparable worth** - the idea that pay ought to be determined by job characteristics rather than by supply and demand, and that people in jobs with comparable requirements should receive comparable wages.

**comparative advantage** - an advantage derived from comparing the opportunity costs of production in two countries; the ability to produce a good or service at a lower opportunity cost than someone else.



**compensating wage differentials** - wage differences that make up for the higher risk or poorer working conditions of one job over another.

**complementary goods** - goods that are used together; as the price of one rises, the demand for the other falls.

**constant returns to scale** - unit costs remain constant as the quantity of production is increased and all resources are variable.

**consumer sovereignty** - the authority of consumers to determine what is produced through their purchases of goods and services.

**consumption** - household spending.

**contracting out** - the process of enlisting a private firm to provide a product or service for a government entity.

**convention** - an institution or procedure increasing efficiency.

**copayment** - paid by an insured person each time the insured service is accessed.

**corporation** - a legal entity owned by shareholders whose liability for the firm's losses is limited to the value of the stock they own.

**cost-plus/markup pricing** - a pricing policy whereby a firm computes its average cost of producing a product and then sets the price at some percentage above this cost.

**coupon** - the fixed amount that the issuer of a bond agrees to pay the bondholder each year.

**cross-price elasticity of demand** - the percentage change in the quantity demanded for one good divided by the percentage change in the price of a related good, everything else held constant.

**crowding** - forcing members of a group into certain kinds of occupations.

**customs union** - an organization of nations whose members have no trade barriers among themselves but impose common trade barriers on nonmembers.

## D

**deadweight loss** - the reduction of consumer surplus without a corresponding increase in profit when a perfectly competitive firm is monopolized.

**deductible** - the amount of expenses that must be paid out of pocket before an insurer will cover any expenses.

**demand** - the amount of a product that people are willing and able to purchase at each possible price during a given period of time, everything else held constant.

**demand curve** - a graph of a demand schedule that measures price on the vertical axis and quantity demanded on the horizontal axis.

**demand schedule** - a table or list of prices and the corresponding quantities demanded for a particular good or service.

**dependent variable** - a variable whose value depends on the value of the independent variable.

**depreciate** - when the value of a currency decreases under floating exchange rates.

**derived demand** - demand stemming from what a resource can produce, not demand for the resource itself.

**determinants of demand** - factors other than the price of the good that influence demand—income, tastes, prices of related goods and services, expectations, and number of buyers.

**determinants of supply** - factors other than the price of the good that influence supply—prices of resources, technology and productivity, expectations of producers, number of producers, and the prices of related goods and services.

**devaluation** - a deliberate decrease in the official value of a currency.

**diminishing marginal utility** - the principle that the more of a good that one obtains in a specific period of time, the less the additional utility yielded by an additional unit of that good.

**direct, or positive, relationship** - the relationship that exists when the values of related variables move in the same direction.

**discrimination** - prejudice that occurs when factors unrelated to marginal revenue product affect the wages or jobs that are obtained.

**diseconomies of scale** - the increase in per unit costs as the quantity of production increases and all resources are variable.

**disequilibrium** - prices at which quantity demanded and quantity supplied are not equal at a particular price.

**disparate impact** - an impact that differs according to race, sex, color, religion, or national origin, regardless of the motivation.

**disparate treatment** - different treatment of individuals because of their race, sex, color, religion, or national origin.

**disutility** - dissatisfaction.

**dividend** - the amount paid to shareholders on each share of stock owned.

**dominant strategy** - a strategy that produces better results no matter what strategy the opposing firm follows.

**double coincidence of wants** - the situation that exists when A has what B wants and B has what A wants.

## E

**economic bad** - any item for which we would pay to have less.

**economic efficiency** - the situation in which the price of a good or service just covers the marginal cost of producing that good or service and people are getting the goods and services that they want.

**economic good** - any item that is scarce.

**economic profit** - accounting profit minus the cost of equity capital.

**economic regulation** - the prescription of price and output for a specific industry.

**economic rent** - the portion of earnings above transfer earnings.

**economies of scale** - the decrease in per unit costs as the quantity of production increases and all resources are variable.

**elasticity** - the responsiveness of quantity demanded or quantity supplied to a change in one of the determinants of demand and/or supply.

**equilibrium** - the price and quantity at which quantity demanded and quantity supplied are equal.

**equilibrium exchange rates** - the exchange rates that are established in the absence of government foreign exchange market intervention.

**equimarginal principle or consumer equilibrium** - to maximize utility, consumers must allocate their scarce incomes among goods in such a way as to equate the marginal utility per dollar of expenditure on the last unit of each good purchased.

**equity capital** - ownership; funds investors or owners put into a firm.

**export subsidies** - payments made by a government to domestic firms to encourage exports.

**export supply curve** - a curve showing the relationship between the world price of a good and the amount that a country will export.

**exports** - products that a country sells to other countries.

**externality** - the cost or benefit of a transaction that is borne by someone not directly involved in the transaction.

## F

**face or *par value*** - the amount that the lender will be repaid when a bond matures.

**facilitating practices** - actions by oligopolistic firms that can contribute to cooperation and collusion even though the firms do not formally agree to cooperate.

**fair rate of return** - a price that allows a monopoly firm to earn a normal profit.

**fallacy of composition** - the mistaken assumption that what applies in the case of one applies to the case of many.

**financial intermediaries** - institutions that accept deposits from savers and make loans to borrowers.

**foreign exchange market intervention** - the buying and selling of currencies by a central bank to achieve a specified exchange rate.

**free good** - a good for which there is no scarcity.

**free rider** - a consumer or producer who enjoys the benefits of a good or service without paying for that good or service.

**free trade area** - an organization of nations whose members have no trade barriers among themselves but are free to fashion their own trade policies toward nonmembers.

**front-end load** - a fee that you pay when you purchase a mutual fund.

**fundamental disequilibrium** - a permanent shift in the foreign exchange market supply and demand curves such that the fixed exchange rate is no longer an equilibrium rate.

## G

**gains from trade** - the difference between what can be produced and consumed without specialization and trade and with specialization and trade.

**game theory** - a description of oligopolistic behavior as a series of strategic moves and countermoves.

**Gini coefficient** - a measure of income inequality ranging between 0 and 1; 0 means that all families have the same income; 1 means that one family has all of the income.

**global fund** - a mutual fund that includes international investments.

**gold exchange standard** - an exchange-rate system in which each nation fixes the value of its currency in terms of gold, but buys and sells the U.S. dollar rather than gold to maintain fixed exchange rates.

**gold standard** - a system whereby national currencies are fixed in terms of their value in gold, thus creating fixed exchange rates between currencies.

## H

**household** - one or more persons who occupy a unit of housing.

**human capital** - skills and training acquired through education and on-the-job training.

## I

**import demand curve** - a curve showing the relationship between the world price of a good and the amount that a country will import.

**imports** - products that a country buys from other countries.

**in-kind transfers** - the allocations of goods and services from one group in society to another.

**incidence or tax incidence** - the share of a tax paid by consumers and/or producers; determining who pays the larger share is said to bear the incidence of the tax.

**income elasticity of demand** - the percentage change in the demand for a good divided by the percentage change in income, everything else held constant.

**increasing returns** - each additional resource adds increasing additional output.

**increasing-returns-to-scale industry** - an industry in which the costs of producing a unit of output fall as more output is produced.

**independent variable** - a variable whose value does not depend on the values of other variables.

**index fund** - a mutual fund that tries to match the performance of a broad market index.

**indifference curve** - a curve showing all combinations of two goods that the consumer is indifferent among.

**indifference map** - a complete set of indifference curves.

**indifferent** - lacking any preference.

**inferior goods** - goods for which demand decreases as income increases; goods for which the income elasticity of demand is negative.

**interest rate parity (IRP)** - the condition under which similar financial assets have the same interest rate when measured in the same currency.

**internalized** - when external costs or benefits are borne by the transactors creating them.

**International Monetary Fund (IMF)** - an international organization that supervises exchange-rate arrangements and lends money to member countries that are experiencing problems meeting their external financial obligations.

**intraindustry trade** - the simultaneous import and export of goods in the same industry by a particular country.

**inverse, or negative, relationship** - the relationship that exists when the values of related variables move in opposite directions.

**investment** - spending on capital goods to be used in producing goods and services.

## L

**labor** - the physical and intellectual services of people, including the training, education, and abilities of the individuals in a society.

**land** - all natural resources, such as minerals, timber, and water, as well as the land itself.

**law of demand** - the quantity of a well-defined good or service that people are willing and able to purchase during a particular period of time decreases as the price of that good or service rises and increases as the price falls, everything else held constant.

**law of diminishing marginal returns** - when successive equal amounts of a variable resource are combined with a fixed amount of another resource, marginal increases in output that can be attributed to each additional unit of the variable resource will eventually decline.

**law of supply** - the quantity of a well-defined good or service that producers are willing and able to offer for sale during a particular period of time increases as the price of the good or service increases and decreases as the price decreases, everything else held constant.

**lemons market** - market in which adverse selection occurs.

**load** - the fees paid to the manager of a mutual fund.

**local monopoly** - a monopoly that exists in a limited geographic area.

**locked in** - the cost of changing to a more efficient technology is higher than the benefit.

**logrolling** - an inefficiency in the political process in which legislators support one another's projects in order to ensure support for their own.

**long run** - a period of time long enough that the quantities of all resources can be varied.

**long-run average-total-cost curve** - the lowest-cost combination of resources with which each level of output is produced when all resources are variable.

**Lorenz curve** - a curve measuring the degree of inequality of income distribution within a society.

**luxury goods** - goods for which the income elasticity of demand is a large positive number.

## M

**macroeconomics** - the study of the economy as a whole.

**marginal cost (MC)** - the change in cost caused by a change in output, derived by dividing the change in total cost by the change in the quantity of output.

**marginal cost or marginal opportunity cost** - the amount of one good or service that must be given up to obtain one additional unit of another good or service, no matter how many units are being produced.

**marginal factor cost (MFC)** - the additional cost of an additional unit of a resource.

**marginal physical product (MPP)** - the additional quantity that is produced when one additional unit of a resource is used in combination with the same quantities of all other resources.

**marginal revenue product (MRP)** - the additional revenue that an additional resource can create for a firm.

**marginal utility** - the additional utility derived from consuming one more unit of a good or service.

**market** - a place or service that enables buyers and sellers to exchange goods and services.

**market capitalization (market cap)** - the stock price multiplied by the number of shares of stock that are outstanding.

**market failure** - a situation in which resources are not allocated to their highest-valued use.

**maturity date** - the specified time at which the issuer of a bond will repay the loan.

**Medicaid** - a joint federal-state program that pays for health care for poor families, the neediest elderly, and disabled persons.

**Medicare** - a federal health care program for the elderly and the disabled.

**microeconomics** - the study of economics at the level of the individual.

**minimum efficient scale (MES)** - the minimum point of the long-run average-total-cost curve; the output level at which the cost per unit of output is the lowest.



**mobility** - the extent to which people move from one income quintile to another over time.

**monopolization** - an attempt by a firm to dominate a market or become a monopoly.

**monopoly** - a market structure in which there is a single supplier of a product.

**monopoly firm (monopolist)** - a single supplier of a product for which there are no close substitutes.

**monopoly power** - market power, the ability to set prices.

**monopsonist** - a firm that is the only buyer of a resource.

**moral hazard** - the problem that arises when people change their behavior from what was expected of them when they engaged in a trade or contract.

**most-favored customer (MFC)** - a customer who receives a guarantee of the lowest price and all product features for a certain period of time.

**multinational business** - a firm that owns and operates producing units in foreign countries.

**mutual fund** - an investment tool that aggregates many different individual stocks or bonds into one entity.

## N

**Nash equilibrium** - no player can be made better off by changing unilaterally.

**natural monopoly** - a monopoly that arises from economies of scale.

**negative economic profit** - total revenue is less than total costs, including opportunity costs.

**negative income tax (NIT)** - a tax system that transfers increasing amounts of income to households earning incomes below some specified level as their income declines.

**net exports** - the difference between the value of exports and the value of imports.

**network externalities** - each additional user increases value of entire network.

**neuroeconomics** - the joint study by economists and biologists that attempts to determine how the brain handles economic decisions.

**no-load fund** - a mutual fund that sells its shares without a commission or sales charge.

**nonrenewable (exhaustible) natural resources** - natural resources whose supply is fixed.

**normal goods** - goods for which demand increases as income increases; goods for which the income elasticity of demand is positive.

**normal profit** - the accounting profit that corresponds to a zero economic profit.

**normative analysis** - analysis of what ought to be.

## O

**occupational segregation** - the separation of jobs by sex.

**offshoring** - the process in which one firm purchases services from another firm in another country (rather than having the services performed in-house).

**opportunity cost** - the highest-valued alternative that must be forgone when a choice is made.

**outsourcing** - the process in which one firm purchases services from another firm (rather than having the services performed in-house).

## P

**partnership** - a business with two or more owners who share the firm's profits and losses.

**perfectly elastic demand curve** - a horizontal demand curve indicating that consumers can and will purchase all they want at one price.

**perfectly inelastic demand curve** - a vertical demand curve indicating that there is no change in the quantity demanded as the price changes.

**point elasticity** - price elasticity of demand measured at a single point on the demand curve.

**positive analysis** - analysis of what is.

**positive economic profit** - total revenue in excess of total costs, including opportunity costs.

**price ceiling** - a situation in which the price is not allowed to rise above a certain level.

**price discrimination** - charging different customers different prices for the same product.

**price elasticity of demand** - the percentage change in the quantity demanded of a product divided by the percentage change in the price of that product.

**price elasticity of supply** - the percentage change in the quantity supplied divided by the percentage change in price, everything else held constant.

**price floor** - a situation in which the price is not allowed to decrease below a certain level.

**price maker** - a firm that sets the price of the product it sells.

**price taker** - a firm in a perfectly competitive market structure.

**principle of mutual excludability** - the rule that an owner of private property is entitled to enjoy the consumption of that property privately.

**principle of rivalry** - when one consumes or uses a good or service, less remains for others.

**private cost** - cost that is borne solely by the individuals involved in the transaction that created the costs.

**private good** - a good that is both excludable and rivalrous.

**private property right(s)** - the right of ownership; the right of individuals to own property.

**private sector** - households, businesses, and the international sector.

**privatization** - transferring a publicly owned enterprise to private ownership.

**producer surplus** - the difference between the price firms would have been willing to accept for their products and the price they actually receive.

**production possibilities curve (PPC)** - a graphical representation showing all possible combinations of quantities of goods and services that can be produced using the existing resources fully and efficiently.

**productivity** - the quantity of output produced per unit of resource.

**progressive tax** - a tax where the rate increases as the base increases; for example, the tax rate rises as income rises.

**proportional tax** - a tax where the tax rate is constant as the base increases; for example, the tax rate is 20% no matter the level of income; a tax whose rate does not change as the tax base changes.

**public good** - a good that is nonexcludable and nonrivalrous.

**public sector** - the government.

**purchasing power parity (PPP)** - the condition under which monies have the same purchasing power in different markets.

## Q

**quantity demanded** - the amount of a product that people are willing and able to purchase at a specific price.

**quantity quota** - a limit on the amount of a good that may be imported.

**quantity supplied** - the amount that sellers are willing and able to offer at a given price during a particular period of time, everything else held constant.

## R

**rational self-interest** - the means by which people choose the options that give them the greatest amount of satisfaction.

**regressive tax** - a tax where the rate decreases as the base increases; for example, a smaller rate applies to higher income levels than lower income levels.

**regulated monopoly** - a monopoly firm whose behavior is monitored and prescribed by a government entity.

**renewable (nonexhaustible) natural resources** - natural resources whose supply can be replenished.

**rent seeking** - the use of resources simply to transfer wealth from one group to another without increasing production or total wealth.

**reserve currency** - a currency that is used to settle international debts and is held by governments to use in foreign exchange market interventions.

**resource market** - a market that provides one of the resources for producing goods and services: labor, capital, and land.

**resources, factors of production or inputs** - goods used to produce other goods, i.e., land, labor, and capital.

## S

**scale** - size; all resources change when scale changes.

**scarcity** - the shortage that exists when less of something is available than is wanted at a zero price.

**short run** - a period of time short enough that the quantities of at least one of the resources used cannot be varied.

**short-run average total cost (SRATC)** - the total cost of production divided by the total quantity of output produced when at least one resource is fixed.

**shortage** - a quantity supplied that is smaller than the quantity demanded at a given price; it occurs whenever the price is less than the equilibrium price.

**shutdown price** - the minimum point of the average-variable-cost curve.

**slope** - the steepness of a curve, measured as the ratio of the rise to the run.

**social cost** - the total cost of a transaction, the private cost plus the external cost.

**social regulation** - the prescription of health, safety, performance, and environmental standards that apply across several industries.

**socially responsible fund** - a group of stocks or bonds of companies that meet specified requirements for ethical behavior or environmental behavior.

**sole proprietorship** - a business owned by one person who receives all the profits and is responsible for all the debts incurred by the business.

**specific fund** - a mutual fund that focuses on a particular industry or a particular part of the world.

**speculators** - people who seek to profit from an expected shift in an exchange rate by selling the currency that is expected to depreciate and buying the currency that is expected to appreciate, then exchanging the appreciated currency for the depreciated currency after the exchange-rate adjustment.

**statistical discrimination** - discrimination that results when an indicator of group performance is incorrectly applied to an individual member of the group.

**stranded assets** - assets acquired by a firm when it was regulated that have little value when the firm is deregulated.

**strategic behavior** - the behavior that occurs when what is best for A depends on what B does, and what is best for B depends on what A does.

**strategic trade policy** - the use of trade restrictions or subsidies to allow domestic firms with decreasing costs to gain a greater share of the world market.

**substitute goods** - goods that can be used in place of each other; as the price of one rises, the demand for the other rises.

**supply** - the amount of a good or service that producers are willing and able to offer for sale at each possible price during a period of time, everything else held constant.

**supply curve** - a graph of a supply schedule that measures price on the vertical axis and quantity supplied on the horizontal axis.

**supply schedule** - a table or list of prices and the corresponding quantities supplied of a particular good or service.

**surplus** - a quantity supplied that is larger than the quantity demanded at a given price; it occurs whenever the price is greater than the equilibrium price.

## T

**tariff** - a tax on imports or exports.

**terms of trade** - the amount of an exported good that must be given up to obtain an imported good.

**total costs (TC)** - the expenses that a business has in supplying goods and/or services.

**total fixed costs (TFC)** - payments to resources whose quantities cannot be changed during a fixed period of time—the short run.

**total physical product (TPP)** - the maximum output that can be produced when successive units of a variable resource are added to fixed amounts of other resources.

**total utility** - a measure of the total satisfaction derived from consuming a quantity of some good or service.

**total variable costs (TVC)** - payments for additional resources used as output increases.

**trade creation** - an effect of a preferential trade agreement that allows a country to obtain goods at a lower cost than is available at home.

**trade deficit** - the situation that exists when imports exceed exports.

**trade diversion** - an effect of a preferential trade agreement that reduces economic efficiency by shifting production to a higher cost producer.

**trade surplus** - the situation that exists when imports are less than exports.

**trade-off** - the giving up of one good or activity in order to obtain some other good or activity.

**transactions costs** - the cost of carrying out a transaction.

**transfer earnings** - the amount that must be paid to a resource owner to get him or her to allocate the resource to another use.

**transfer payments** - income transferred by the government from a citizen who is earning income to another citizen.

## U

**utility** - a measure of the satisfaction received from possessing or consuming goods and services.

## V

**value quota** - a limit on the monetary value of a good that may be imported.

## W

**World Bank** - an international organization that makes loans and provides technical expertise to developing countries.

## Z

**zero economic profit** - total revenue equal to total costs, including opportunity costs.

**zero-coupon bond** - a bond that provides no interest payments but is issued at a value lower than its face value.



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## U.S. Macroeconomic Data for Selected Years, 1965–2011

| Year  | Real GDP    | Consumption | Investment | Government Spending | Net Exports | GDP Growth Rate |
|-------|-------------|-------------|------------|---------------------|-------------|-----------------|
|       | \$ billions |             |            |                     |             | %               |
| 1965  | 3,392.3     | 2,241.8     | 437.3      | 1,086.4             | -18.9       | 6.4             |
| 1970  | 4,269.9     | 2,740.2     | 475.1      | 1,212.4             | -52.0       | 0.2             |
| 1975  | 4,879.5     | 3,214.1     | 504.1      | 1,268.4             | -2.4        | -0.2            |
| 1976  | 5,141.3     | 3,393.1     | 605.9      | 1,249.7             | -37.0       | 5.3             |
| 1977  | 5,377.7     | 3,535.9     | 697.4      | 1,272.3             | -61.1       | 4.6             |
| 1978  | 5,677.6     | 3,691.8     | 781.5      | 1,331.2             | -61.9       | 5.6             |
| 1979  | 5,855.0     | 3,779.5     | 806.4      | 1,343.8             | -41.0       | 3.2             |
| 1980  | 5,839.0     | 3,766.2     | 717.9      | 1,349.4             | 12.6        | -0.2            |
| 1981  | 5,987.2     | 3,823.3     | 782.4      | 1,379.9             | 8.3         | 2.5             |
| 1982  | 5,870.9     | 3,876.7     | 672.8      | 1,420.1             | -12.6       | -1.9            |
| 1983  | 6,136.2     | 4,098.3     | 735.5      | 1,443.2             | -60.2       | 4.5             |
| 1984  | 6,577.1     | 4,315.6     | 952.1      | 1,532.3             | -122.4      | 7.2             |
| 1985  | 6,849.3     | 4,540.4     | 943.3      | 1,635.5             | -141.5      | 4.1             |
| 1986  | 7,086.5     | 4,724.5     | 936.9      | 1,716.6             | -156.3      | 3.5             |
| 1987  | 7,313.3     | 4,870.3     | 965.7      | 1,755.6             | -148.4      | 3.4             |
| 1988  | 7,613.9     | 5,066.6     | 988.5      | 1,786.2             | -106.8      | 4.1             |
| 1989  | 7,885.9     | 5,209.9     | 1,028.1    | 1,829.4             | -79.2       | 3.5             |
| 1990  | 8,033.9     | 5,316.2     | 993.5      | 1,859.8             | -54.7       | 1.9             |
| 1991  | 8,015.1     | 5,324.2     | 912.7      | 1,875.6             | -14.6       | -0.2            |
| 1992  | 8,287.1     | 5,505.7     | 986.7      | 1,897.9             | -15.9       | 3.3             |
| 1993  | 8,523.4     | 5,701.2     | 1,074.8    | 1,883.9             | -52.1       | 2.7             |
| 1994  | 8,870.7     | 5,918.9     | 1,220.9    | 1,884.1             | -79.4       | 4.0             |
| 1995  | 9,093.7     | 6,079.0     | 1,258.9    | 1,872.5             | -81.53      | 2.5             |
| 1996  | 9,433.9     | 6,291.2     | 1,370.3    | 1,925.9             | -101.61     | 3.7             |
| 1997  | 9,854.3     | 6,523.4     | 1,540.8    | 1,951.5             | -169.26     | 4.5             |
| 1998  | 10,283.5    | 6,865.5     | 1,659.1    | 2,018.1             | -276.28     | 4.2             |
| 1999  | 10,779.8    | 7,240.9     | 1,844.3    | 2,095.9             | -381.98     | 4.5             |
| 2000  | 11,226.0    | 7,608.1     | 1,970.3    | 2,099.8             | -475.28     | 3.7             |
| 2001  | 11,347.2    | 7,813.9     | 1,831.9    | 2,216.4             | -488.39     | 0.8             |
| 2002  | 11,553.0    | 8,021.9     | 1,807.0    | 2,305.7             | -595.20     | 1.6             |
| 2003  | 11,840.7    | 8,247.6     | 1,871.6    | 2,343.7             | -614.30     | 2.7             |
| 2004  | 12,263.8    | 8,532.7     | 2,058.2    | 2,357.6             | -726.63     | 4.2             |
| 2005  | 12,638.4    | 8,819.0     | 2,172.2    | 2,283.9             | -745.44     | 3.5             |
| 2006  | 12,976.4    | 9,073.50    | 2,230.4    | 2,409.4             | -694.70     | 2.70            |
| 2007  | 13,228.9    | 9,289.50    | 2,161.6    | 2,455.3             | -564.60     | 1.90            |
| 2008  | 13,228.2    | 9,265.00    | 1,957.3    | 2,520.5             | -478.00     | 0.00            |
| 2009  | 12,880.6    | 9,153.90    | 1,515.7    | 2,548.5             | -346.86     | -2.60           |
| 2010  | 13,248.7    | 9,315.70    | 1,708.0    | 2,570.1             | -414.20     | 2.80            |
| 2011* | 12,260.3    | 9,430.00    | 1,769.0    | 2,570.1             | -414.20     | 2.80            |

\*Values are estimates

| GDP<br>Price<br>Deflator | Consumer<br>Price<br>Index | Inflation | Federal<br>Surplus/<br>Deficit | Civilian<br>Labor<br>Force | Unemploy-<br>ment Rate | M1          | M1<br>Growth<br>Rate | M2          | M2<br>Growth<br>Rate | Federal<br>Funds<br>Rate** |
|--------------------------|----------------------------|-----------|--------------------------------|----------------------------|------------------------|-------------|----------------------|-------------|----------------------|----------------------------|
| index                    |                            | %         | \$ billions                    | millions                   | %                      | \$ billions | %                    | \$ billions |                      | %                          |
| 20.09                    | 31.5                       | 1.6       | -1.4                           | 74.46                      | 4.5                    | 167.8       | 4.7                  | 459.2       | 8.1                  | 4.07                       |
| 24.75                    | 38.8                       | 5.7       | -2.8                           | 82.77                      | 4.9                    | 214.4       | 5.1                  | 626.5       | 6.6                  | 7.18                       |
| 34.46                    | 53.8                       | 9.1       | -53.2                          | 93.78                      | 8.5                    | 287.1       | 4.7                  | 1,016.2     | 12.6                 | 5.82                       |
| 36.93                    | 56.9                       | 5.8       | -73.7                          | 96.16                      | 7.7                    | 306.2       | 6.7                  | 1,152.0     | 13.4                 | 5.04                       |
| 38.76                    | 60.6                       | 6.5       | -53.7                          | 99.01                      | 7.1                    | 330.9       | 8.1                  | 1,270.3     | 10.3                 | 5.54                       |
| 41.56                    | 65.2                       | 7.6       | -59.2                          | 102.25                     | 6.1                    | 357.3       | 8.0                  | 1,366.0     | 7.5                  | 7.93                       |
| 45.19                    | 72.6                       | 11.3      | -40.7                          | 104.96                     | 5.8                    | 381.8       | 6.9                  | 1,473.7     | 7.9                  | 11.19                      |
| 49.59                    | 82.4                       | 13.5      | -73.8                          | 106.94                     | 7.1                    | 408.5       | 7.0                  | 1,599.8     | 8.6                  | 13.36                      |
| 53.69                    | 90.9                       | 10.3      | -79.0                          | 108.67                     | 7.6                    | 436.7       | 6.9                  | 1,755.4     | 9.7                  | 16.38                      |
| 56.47                    | 96.5                       | 6.2       | -128.0                         | 110.20                     | 9.7                    | 474.8       | 8.7                  | 1,910.3     | 8.8                  | 12.26                      |
| 58.36                    | 99.6                       | 3.2       | -207.8                         | 111.55                     | 9.6                    | 521.4       | 9.8                  | 2,126.5     | 11.3                 | 9.09                       |
| 60.47                    | 103.9                      | 4.3       | -185.4                         | 113.54                     | 7.5                    | 551.6       | 5.8                  | 2,310.0     | 8.6                  | 10.23                      |
| 62.14                    | 107.6                      | 3.6       | -212.3                         | 115.46                     | 7.2                    | 619.8       | 12.4                 | 2,495.7     | 8.0                  | 8.10                       |
| 63.57                    | 109.6                      | 1.9       | -221.2                         | 117.83                     | 7.0                    | 724.7       | 16.9                 | 2,732.3     | 9.5                  | 6.81                       |
| 64.53                    | 113.6                      | 3.6       | -149.7                         | 119.87                     | 6.2                    | 750.2       | 3.5                  | 2,831.5     | 3.6                  | 6.66                       |
| 67.95                    | 118.3                      | 4.1       | -155.2                         | 121.67                     | 5.5                    | 786.7       | 4.9                  | 2,994.5     | 5.8                  | 7.57                       |
| 70.32                    | 124.0                      | 4.8       | -152.6                         | 123.87                     | 5.3                    | 792.9       | 0.8                  | 3,158.5     | 5.5                  | 9.21                       |
| 73.24                    | 130.7                      | 5.4       | -221.0                         | 125.84                     | 5.6                    | 824.7       | 4.0                  | 3,278.8     | 3.8                  | 8.10                       |
| 75.57                    | 136.2                      | 4.2       | -269.2                         | 126.35                     | 6.8                    | 897.1       | 8.8                  | 3,379.7     | 3.1                  | 5.69                       |
| 77.21                    | 140.3                      | 3.0       | -290.3                         | 128.11                     | 7.5                    | 1,025.0     | 14.3                 | 3,433.1     | 1.6                  | 3.52                       |
| 78.90                    | 144.5                      | 3.0       | -255.1                         | 129.20                     | 6.9                    | 1,129.7     | 10.2                 | 3,484.3     | 1.5                  | 3.02                       |
| 80.58                    | 148.2                      | 2.6       | -203.2                         | 131.06                     | 6.1                    | 1,150.3     | 1.8                  | 3,497.6     | 0.4                  | 4.21                       |
| 82.20                    | 152.4                      | 2.8       | -164.0                         | 132.30                     | 5.6                    | 1,126.8     | -2.0                 | 3,640.6     | 4.1                  | 5.83                       |
| 83.71                    | 156.9                      | 3.0       | -107.4                         | 133.94                     | 5.4                    | 1,080.0     | -4.2                 | 3,815.3     | 4.8                  | 5.30                       |
| 85.05                    | 160.5                      | 2.3       | -21.9                          | 136.30                     | 4.9                    | 1,072.2     | -0.7                 | 4,031.7     | 5.7                  | 5.46                       |
| 86.00                    | 163.0                      | 1.6       | 69.3                           | 137.67                     | 4.5                    | 1,094.9     | 2.1                  | 4,383.7     | 8.7                  | 5.35                       |
| 87.31                    | 166.6                      | 2.2       | 125.6                          | 139.37                     | 4.2                    | 1,123.1     | 2.6                  | 4,648.7     | 6.0                  | 4.97                       |
| 89.45                    | 172.2                      | 3.4       | 236.2                          | 142.58                     | 4.0                    | 1,087.6     | -3.2                 | 4,931.3     | 6.1                  | 6.24                       |
| 91.32                    | 177.1                      | 2.8       | 128.2                          | 143.73                     | 4.7                    | 1,182.1     | 8.7                  | 5,450.3     | 10.5                 | 3.88                       |
| 92.89                    | 179.9                      | 1.6       | -157.8                         | 144.86                     | 5.8                    | 1,219.2     | 3.1                  | 5,800.3     | 6.4                  | 1.67                       |
| 94.34                    | 184.0                      | 2.3       | -377.6                         | 146.51                     | 6.0                    | 1,304.2     | 7.0                  | 6,079.4     | 4.8                  | 1.13                       |
| 97.87                    | 188.9                      | 2.7       | -412.7                         | 147.40                     | 5.5                    | 1,372.1     | 5.2                  | 6,422.1     | 5.6                  | 1.35                       |
| 101.30                   | 195.3                      | 3.4       | -318.3                         | 149.32                     | 5.1                    | 1,368.9     | -0.2                 | 6,680.5     | 4.0                  | 3.22                       |
| 104.29                   | 211.4                      | 4.1       | -248.2                         | 150.06                     | 4.5                    | 1,370.0     | 12.8                 | 6,785.0     | 6.5                  | 5.25                       |
| 106.96                   | 207.3                      | 2.8       | -162.0                         | 153.11                     | 4.5                    | 1,371.0     | 2.5                  | 7,222.4     | 5.9                  | 5.25                       |
| 109.30                   | 211.3                      | -0.04     | -458.3                         | 154.09                     | 5.1                    | 1,400.0     | 20.2                 | 7,790.8     | 9.0                  | 4.94                       |
| 109.94                   | 217.2                      | 2.7       | -1412.0                        | 154.06                     | 9.7                    | 1,640.0     | 16.4                 | 8,400.7     | 3.2                  | 2.10                       |
| 111.64                   | 220.2                      | 1.4       | -1293.0                        | 153.20                     | 9.8                    | 1,716.0     | 15.9                 | 8,654.3     | 3.0                  | 0.15                       |
| 113.09                   | 226.00                     | 4.60      | -1645.0                        | 152.70                     | 9.1                    | 2,500.0     | 28.5                 | 9,544.7     | 15.0                 | 0.18                       |

\*\*Values are annual averages.



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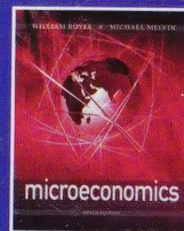
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